UNIVERSITY OF THE PUNJAB

NOTIFICATION

It is hereby notified that the Syndicate at its meeting held on 17-12-2022 has approved the recommendations of the Academic Council made at its meetings dated 11-03-2022 and 21-03-2022 respectively regarding approval to start BS Technology Education Program alongwith Syllabi/Scheme of Studies for the Department of Technology Education, Institute of Education & Research w.e.f Academic Session 2021.

The Syllabi and Scheme of Studies of BS Technology Education Program is enclosed herewith as Annexure-'A'.

Sd/-
Registrar

Admin. Block,
Quaid-i-Azam Campus,
Lahore.

No. D/ 810 /Acad. **Dated: 03-02-/2023.**

Copy of the above is forwarded to the following for information and necessary action:-

1. Dean, Faculty of Education
2. Director, Institute of Education & Research.
3. Chairman, Department of Technology Education
4. Controller of Examinations
5. Director, IT for placement at website
6. Admin. Officer (Statutes)
7. Secretary to the Vice-Chancellor
8. Private Secretary to the Registrar
9. Assistant (Syllabus)

Assistant Registrar (Academic)
for Registrar

Department of Technology Education (DTE)
IER, University of the Punjab, Quaid-i-Azam Campus, Lahore-54590, Pakistan

BS Technology Education

4-Year Program

(Regular and Self-Supporting)

(As Per Revised Undergraduate Policy of HEC,2021)

Institute of Education and Research
University of the Punjab
Lahore

CONTENT

Program Title: BS Technology Education (BSTE)

Department: Department of Technology Education (DTE), IER

Faculty: Faculty of Education

1. **Department Mission**

The primary mission of the department is to enrich the scholastic experience of our students. We train our students for life, work, and citizenship in the 21st century by developing critical thinking and problem-solving skills through knowledge and hands-on project-based learning. The Department is committed to the production of high-level manpower of international standards in Technology Education to serve the educational and industrial needs of the nation through teaching and research. The Department is also dedicated to becoming one of the leading Departments in skills acquisition through technology education and research among the Pakistani Universities.

Department Vision

Department of Technology Education (DTE) is desired to be recognized as a leader for providing technical education. The program will become eminent by a personalized focus on students with an integrated and upgraded curriculum, the dedication of the entire faculty to transform our students for the world of work. Department will make a positive, long-term impact on students through vibrant discovery, applied knowledge, and creative interaction. Graduates are expected well-prepared as technology educators for the socio-economic development of the country.

2. **Department Introduction**

The Department of Technology Education was established in 1962 as a constituent department of the Institute of Education and Research to produce technical teachers in Pakistan. The graduates of the Department of Technology Education (DTE) are performing in almost all paces of a human career in technical education, and managerial capacities both inside and outside Pakistan. Our graduates have been, and are still performing as Principals, Director, Deputy Director, Assistant Director, and Production Managers of most of the TVET Institutes and industrial sector in Pakistan. The Department offers a 2-year master's degree program, Master of Technology Education (MTE), and 1.5-year B.Ed. (Technical Education).

Currently, the department is pursuing the goals listed below:

1. Train teachers for technology-related subjects being taught at the elementary and Secondary school level.

2. Prepare trained teachers and managers for top and middle-level positions for TVET institutes and industry

3. Provide consultancy and teacher training support to Technical Education and Vocational Training (TVET) institutes and industry on demand.

3 Program Introduction

The study program applies major concepts and emerging trends in Technology education. This highly content enriched degree program is intended to prepare students for successful careers by building a solid foundation of the required knowledge and skills that lead to careers in TVET and training institutes of industries. Graduates with technology education would equip technology content knowledge, as well as develop pedagogical skills. Integral elements of the study program are teaching practice in selected TVET institutions and internships in industries to taste the world of work. This exclusive blend makes future teachers uniquely qualified to teach technology as well as serve the economy by contributing as technology leaders and managers.

4 Program Objectives

Objectives of the program are to:

1. Develop positive perceptions and skills in students that empower them to be valuable leaders in both academia and industry.
2. Develop professional knowledge for methodological and pedagogical practice in TVET
3. Deliver an integrated knowledge of technology education to students performing as educators and managers.
4. Deliver experiences in modern forms of teaching and learning
5. Demonstrate research skills necessary to create and apply knowledge to emerging technology and teaching issues.
6. Develop a competent faculty to gain excellence in teaching and research activities.
7. Offer the practical experience of teaching in TVET institutes (Practice Teaching).

8. Offer practical experiences in industries under the guidance of trained personnel (internship).

5 Market Need/Rationale of Program

Pakistan is the 6th most populous country in the world. The total estimated population during the year 2020 was 220.89 million. Pakistan is the fifth largest young country in the world. Around 63 percent population of the country comprises youth aged between 15 and 33 (UN Population Fund Report 2017). This young and dynamic population can be an asset if appropriately trained. Unfortunately, less than 20% of youth complete secondary education whereas a meager percentage acquires hand skills (Technical, Vocational Education & Training). Pakistan is confronted with enormous socio-economic challenges. Pakistan was ranked 154th among 189 countries on UN's Human Development Index (HDI) 2020 rankings. 52% of Pakistan's population is facing situations of multidimensional poverty, and 22.3% of the population survives on less than $1.25 per day.

Provision of Technology Education is necessary to make the youth useful and economically productive citizens. The present-day rapid socio-economic growth demands a mixture of trained manpower; comprising of skilled workers; tradesmen; technicians; technologists; engineers; and research & development scientists. The composition of the required workforce would depend upon the needs of the society, level of skill, and technology applied in the system/industry.

Increased demand for technically trained manpower in all sectors, both domestically and internationally, is expected in the coming years, particularly in the infrastructure & energy sectors and in new technologies. The development of China - Pakistan Economic Corridor (CPEC) and better energy supply are expected to play a significant role to improve the economic growth of the country in the coming years. The fact is thus duly recognized by the federal and provincial governments.

Department of Technology Education (DTE), Institute of Education and Research (IER), University of the Punjab, Lahore is pioneer department in the discipline of Technology Education throughout the

country assumes the responsibility to address these multifaceted challenges by introducing Technology education four years degree program.

After Graduation

Employment and Entrepreneurship: Our graduates are supposed to typically hired across the country to teach in public and private TVET institutes, technical staff training institutes in industries as well. Examples include Industrial Management, Designing, and Experimental Crafts, Glass Ceramics & Pottery, Manufacturing Technology, and Engineering Drawing, Electricity, and Electronics, etc. Because of the extensive training, individuals who choose not to teach after graduation may start lucrative and successful careers through job opportunities and entrepreneurship in all types of fields mentioned above.

Keeping in view the current Higher Education Commission (HEC) policy, which emphasized that four years bachelor's degree programs in all disciplines must provide enhanced content knowledge. Realizing the critical importance of mastery in content, this program is designed to equip the graduates with enriched content knowledge which is a unique milestone of this program namely BS (TE). The duration of this program is 4-years that consist of 08 semesters; each is of 16-18 weeks with 15-18 credit hours. Detail of courses is given in the scheme of studies.

a) Students, Alumni, and Employers Feedback

Studies have been conducted at the Department of Technology Education to assess the effectiveness of its Master of Technology Education (MTE) program at the master level. Students, alumni, and employers of MTE graduates working in different TVET institutes and industries have suggested launching of four-year BS degree program of technology education.

b) Academic Projections: *(International universities that have launched the similar program)*

1. Indiana State University, USA
2. Red River College, Winnipeg, Manitoba, Canada
3. Western Michigan University, USA
4. California University of Pennsylvania, USA

5. State University of New York, Buffalo

A list of universities offering programs for Technology Education is attached (Appendix-A) downloaded from

http:/www. universities.com/programs/industrial-technology-education-degrees

c) Faculty

The department has 2 Ph.D. and 1 Non-PhD permanent teacher along with 5 visiting teachers with teaching and research experience of more than 15 years.

d) Physical Facilities

(As available in Department Computer lab, Electricity/Electronics lab, Drafting lab, Art and experimental craft lab, Metal lab, and wood lab)

6 Admission Eligibility Criteria

Pre-requisites

- Matric with Science
- DAE / Intermediate or Equivalent

Note:

- DAE or Intermediate with any one subject from Mathematics, Physics, Chemistry, and Computer can opt all areas of specialization.
- Intermediate with other subjects can opt only following areas of specialization:
    a. Industrial Management
    b. Designing and Experimental Crafts
    c. ICT in Education
    d. Engineering Drawing
    e. Manufacturing Technology

Merit Criteria for Admission

As per University /IER prescribed rules and regulations.

7 Duration of Program

Duration: 4 Years
Semesters: 8
Semester Duration: 16-18 weeks
Course Load per Semester: 15-18 Credit Hours
Number of Courses per semester: 5-6

Scheme of Studies

Scheme of studies consist of combination of following courses:

I. Compulsory/General Education Courses

II. Compulsory/Additional General Education Courses

III. Major Courses

IV. Major Courses (Specialization)

V. Distribution Courses

VI. Practice Teaching

VII. Practical Learning

VIII. Thesis/Research Project

IX. Quran Translation

The following tables show the courses and credit hours suggested for this program

S#	Course Code	Course Title	Course Type	Semester
	Compulsory/General	**Education Courses**		**[CR-15]**
1	CG-101	Introduction to Expository Writing	Expository Writing-I	I
2	CG-102	Cross Cultural Communication and Translation Skills	Expository Writing-II	II
3	CG-201	Critical Reading and Academic Writing	Expository Writing-III	III
4	CG-202 CG-203	Islamic Studies OR Religious Studies (for Non-Muslim)	Islamiat Religious Studies	III
5	CG-204	Pakistan Studies	Pakistan Studies	III
	General/ Additional Courses	**Choose any 08 Courses**		**[CR-24]**
	Arts and Humanities	**(Choose Any 02 Courses)**	**[CR-06]**	
1	CGAH-101	Urdu	Arts and Humanities	I
2	CGAH-102	Arabic	Arts and Humanities	I
3	CGAH-103	Islamic Studies	Arts and Humanities	II
4	CGAH-104	Persian	Arts and Humanities	II
5	CGAH-105	Statistics	Arts and Humanities	II
6	CGAH-106	Fine Arts	Arts and Humanities	II

7	CGAH-107	Journalism	Arts and Humanities	II
8	CGAH-108	Physical Education	Arts and Humanities	II
9	CGAH-109	Geography	Arts and Humanities	II
	Social Sciences	**(Choose Any 02 Courses)**	**[CR-06]**	
1	CGSS-101	Psychology	Social Sciences	I
2	CGSS-102	Philosophy	Social Sciences	II
3	CGSS-103	Economics	Social Sciences	II
4	CGSS-104	History	Social Sciences	II
5	CGSS-105	Political Science	Social Sciences	II
6	CGSS-106	Sociology	Social Sciences	II
7	CGSS-107	Science, Technology and Society	Social Sciences	II
8	CGSS-108	Human Resource Management	Social Sciences	II
	Natural Sciences	**(Choose Any 02 Courses)**	**[CR-06]**	
1	CGNS-101	General Science	Natural Sciences	I
2	CGNS-102	General Mathematics	Natural Sciences	II
3	CGNS-103	Environmental Sciences	Natural Sciences	II
4	CGNS-104	Computer Sciences	Natural Sciences	I
5	CGNS-105	Public Health	Natural Sciences	II
		Quantitative Reasoning	**[CR-06]**	
1	CGQR-101	Logic	Quan. Reasoning	I
2	CGQR-102	Mathematical Reasoning	Quant. Reasoning	II
	Distribution Courses	**(Choose Any 08 Courses)**		**[CR-24]**
1	DCEd-201	Designing and Experimental Crafts	Distribution	III
2	DCEd-202	Technical and Geometrical Drawing	Distribution	III
3	DCEd-203	Manufacturing Technology (Wood and Metal)	Distribution	IV
4	DCEd-204	Computer Aided Technical Sketching and Illustrations	Distribution	IV
5	DCEd-205	Basic Electricity	Distribution	IV
6	DCEd-206	General Electronics	Distribution	IV

7	DCEd-207	Industrial Management	Distribution	IV
8	DCEd-208	Glass, Ceramic and Pottery	Distribution	IV
9	DCEd-209	Entrepreneurship in Technology Education	Distribution	IV
10	DCEd-210	Introduction to Information Technology	Distribution	IV

Major Courses				**[CR-39]**
1	MCEd-201	Education in Pakistan	Major	IV
2	MCEd-301	Philosophy of Education	Major	V
3	MCEd-302	Learning Theories	Major	V
4	MCEd-303	Curriculum Development	Major	V
5	MCEd-304	Teaching Profession	Major	V
6	MCEd-305	General Methods of Teaching	Major	V
7	MCEd-306	School Management	Major	V
8	MCEd-307	Islamic System of Education	Major	VI
9	MCEd-308	Educational Assessment	Major	VI
10	MCEd-309	Instructional Technology	Major	VI
11	MCEd-310	Research in Education	Major	VI
12	MCEd-311	Technical Writing and Presentation Skills	Major	VI
13	MCEd-401	Comparative Education	Major	VII
Practical Learning				**[CR-03]**
1	PL-301	Scouting	Practical Learning	VI
2	PL-302	Emergency Training	Practical Learning	VI
3	PL-303	Community Services	Practical Learning	VI
Practice Teaching				**[CR-03]**
1	PT-402	Practice Teaching		VII
Thesis/Research Project				**[CR-06]**

1	Th-401	Thesis/Research Project		VII, VIII
		Quran Translation		**[CR-03]**
1	QT-100	Quran Translation		I-VIII
		Major Courses (Specialization)		**[CR-15]**
	Area-1:	**ICT in Education**		
1	MCTE-401 ICT	Fundamental of Web Development	Additional Major	VII
2	MCTE-402 ICT	Online Learning Management System	Additional Major	VII
3	MCTE-403 ICT	Development of Digital Skills	Additional Major	VIII
4	MCTE-404 ICT	Digital Tools of Instructors and Learners	Additional Major	VIII
5	MCTE-405 ICT	Technical Project Development	Additional Major	VIII
	Area-2:	**Computer Hardware**		
1	MCTE-401 CH	Personal Computer Hardware	Additional Major	VII
2	MCTE-402 CH	Digital Logic Design	Additional Major	VII
3	MCTE-403 CH	Computer Architect & Components	Additional Major	VIII
4	MCTE-404 CH	Micro-Controller Programming	Additional Major	VIII
5	MCTE-405 CH	Technical Project Development	Additional Major	VIII
	Area-3:	**Drawing**		
1	MCTE-401 ED	Technical Sketching and Reproduction	Additional Major	VII
2	MCTE-402 ED	Production and Constructional Design	Additional Major	VII
3	MCTE-403 ED	Industrial/Mechanical Drawing	Additional Major	VIII
4	MCTE-404 ED	Freehand and Architectural Drawing	Additional Major	VIII
5	MCTE-405 ED	Technical Project Development	Additional Major	VIII
	Area-4:	**Electricity**		
1	MCTE-401 EL	Electrical Wiring	Additional Major	VII

2	MCTE-402 EL	Electrical Winding	Additional Major	VII
3	MCTE-403 EL	Electrical Generation & Transmission	Additional Major	VIII
4	MCTE-404 EL	Repair and Maintenance of Household Appliances	Additional Major	VIII
5	MCTE-405 EL	Technical Project Development	Additional Major	VIII
	Area-5:	**Electronics**		
1	MCTE-401 ET	Principles of Electronics	Additional Major	VII
2	MCTE-402 ET	Industrial Electronics	Additional Major	VII
3	MCTE-403 ET	Equipment Maintenance & Servicing	Additional Major	VIII
4	MCTE-404 ET	CCTV Security Surveillance	Additional Major	VIII
5	MCTE-405 ET	Technical Project Development	Additional Major	VIII
	Area-6:	**Industrial Management**		
1	MCTE-401 IM	Organizational Behavior	Additional Major	VII
2	MCTE-402 IM	Plant Layout and Material Handling	Additional Major	VII
3	MCTE-403 IM	Industrial Safety	Additional Major	VIII
4	MCTE-404 IM	Project Management	Additional Major	VIII
5	MCTE-405 IM	Technical Project Development/ Internship	Additional Major	VIII
	Area-7:	**Designing and Experimental Crafts**		
1	MCTE-401 DE	Drafting and Pattern Making	Additional Major	VII
2	MCTE-402 DE	Fashion Designing	Additional Major	VII
3	MCTE-403 DE	Fabric Printing	Additional Major	VIII
4	MCTE-404 DE	Interior Decoration	Additional Major	VIII
5	MCTE-405 DE	Technical Project Development	Additional Major	VIII

	Area-8:	**Manufacturing Technology**		
1	MCTE-401 MT	Introduction to Engineering Materials	Additional Major	VII
2	MCTE-402 MT	Foundry Technology	Additional Major	VII

3	MCTE-403 MT	Metallurgical Manufacturing Technology	Additional Major	VIII
4	MCTE-404 MT	Metal Joining and Heat Treatment Technology	Additional Major	VIII
5	MCTE-405 MT	Technical Project Development	Additional Major	VIII
	Area-9:	**Glass, Ceramics & Pottery**		
1	MCTE-401 GC	Glass Technology	Additional Major	VII
2	MCTE-402 GC	Ceramic Production Techniques	Additional Major	VII
3	MCTE-403 GC	Properties of Glass and Ceramics Material	Additional Major	VIII
4	MCTE-404 GC	Sanitary Wares and Tiles	Additional Major	VIII
5	MCTE-405 GC	Technical Project Development	Additional Major	VIII
	Area :10	**Solar Power**		
1	MCTE-401 SP	Solar Thermal Energy	Additional Major	VII
2	MCTE-402 SP	Solar Photovoltaic System	Additional Major	VII
3	MCTE-403 SP	Energy Storage System	Additional Major	VIII
4	MCTE-404 SP	Solar Power Plant Design	Additional Major	VIII
5	MCTE-405 SP	Technical Project Development	Additional Major	VIII
	Area :11	**Telecommunication**		
1	MCTE-401 TC	Telecommunication Fundamentals	Additional Major	VII
2	MCTE-402 TC	Mobile Telecommunication	Additional Major	VII
3	MCTE-403 TC	Cellular Troubleshooting	Additional Major	VIII
4	MCTE-404 TC	Telecom Services & Terminal Equipment	Additional Major	VIII
5	MCTE-405 TC	Technical Project Development	Additional Major	VIII

Total Credit Hours Streamwise

S#	Courses	Credit Hours
1	Compulsory/General Education Courses	15
2	Compulsory/Additional General Education Courses	24
3	Major Courses	39
4	Major Courses (Specialization)	15
5	Distribution Courses	24
6	Practice Teaching	03
7	Practical Learning	03

8	Thesis/Research Project	06
9	Quran Translation	03
	Total	**132**

APPENDICES

(Annexure-A)

Technology and Engineering Education (BS) Indiana State University

Technology and Engineering Education (BS) Description

The University offers a Bachelor of Science (BS) in technology and engineering education for students who wish to obtain licensure to teach in middle school, junior high, and high school.

The Technology and Engineering Education Program prepares persons to teach in the areas of pre-engineering, communications, construction, manufacturing, biotechnology, and transportation/power and energy. The content is derived extensively from technology and the impact that technology makes on society and the environment.

Coursework includes a core of technology courses—plus electives selected in consultation with an advisor. In addition, students complete a sequence of professional courses offered by the Bayh College of Education and the College of Technology to prepare for teaching.

Indiana State's Technology and Engineering Education Program is distinctive in its emphasis on blending classroom learning with practical experience and extracurricular activities that result in exciting and challenging study.

- Students benefit from one-on-one guidance from dedicated faculty mentors. Most hold doctoral degrees, have experience teaching technology and engineering education in the public schools, and engage in research and scholarly publication.
- Coursework is centered in the University's John T. Myers Technology Center, which has more than 20 state-of-the-art laboratories and well-equipped classrooms.
- Students gain teaching skills through classroom and field experiences in the Bayh College of Education and the College of Technology and through their required student teaching experience.
- A number of activities and organizations are available that enable students to interact with other students and professionals in the industry. These include chapters of the Technology Education Collegiate Association (TECA) and Epsilon Pi Tau (the international honorary for professions in technology).
- Eligible students may participate in the University's Honors Program and study abroad opportunities, which range from summer programs to a single semester or a full academic year in over 56 countries.

Special Note: The University has articulation agreements with Ivy Tech Community College and Vincennes University that allow for seamless transfer of credits to the Technology and Engineering Education Program.

Careers

Graduates are eligible to teach in middle schools, junior highs, and high schools in the areas of pre-engineering, communications, construction, manufacturing, biotechnology, and transportation/power and energy.

In addition, the program is preparation for graduate studies.

Accreditation

The University is accredited by the Higher Learning Commission.

In addition, the Technology and Engineering Education Program is accredited by the National Council for the Accreditation of Teacher Education.

Financial Aid & Scholarships

Students have many sources of financial support for their studies, including financial aid, work-study programs, veterans' benefits, and special scholarships for entering freshmen and transfer students.

In addition, the College of Technology offers a variety of scholarships and awards.

Further Information

Prospective students should contact the Office of Admissions for further information and assistance.

Currently enrolled students should contact the following:

Department of Applied Engineering and Technology Management
Indiana State University
812-237-9633
888-478-7003 (toll free)

The Graduate Catalog and Undergraduate Catalog of Indiana State University are the documents of authority for all students. The requirements given in the catalogs supersede information issued by any academic department, program, college, or school. The University reserves the right to change the requirements at any time.

Tools

Required Courses
Degree map
Outcomes

Find a Program

- Majors
- Minors
- Certificates
- Licensures

Related Links

Applications & Instructions
Class Schedule
Financial Aid - Freshmen
Financial Aid - Transfer Students
Scholarships
Tuition & Fees

Contact

Prospective students should contact the Office of Admissions for further information and assistance.

Currently enrolled students should contact the following:

Department of Applied Engineering and Technology Management
Indiana State University
812-237-9633
888-478-7003 (toll free)

Industrial Arts/Technology Teacher Education

Overview

- Bachelor of Education five-year joint diploma/degree program with the University of Winnipeg
- September entry date
- Annual application deadline: March 1
- Notre Dame Campus, Winnipeg, and University of Winnipeg
- Applicants must apply directly to the University of Winnipeg
- If you have a criminal record or are listed on a Child Abuse Registry you may not be able to complete this program. See Program Progression Requirements for more info.
- International applicants contact RRC's International Education Office at intled@rrc.ca or 204-632-2143 for information on this program and space availability

Description

This is an integrated diploma/degree program offered at Red River College and the University of Winnipeg. The program develops the teaching and technical skills you require for teaching the industrial arts and technology education programs in the public school system.

Emphasis is placed on developing your knowledge and skills in the following areas:

- Manufacturing
- Power and energy
- Graphic communications
- Construction
- Computer applications
- Teaching methodology for industrial arts and technology education

When you successfully complete the five-year program you will have earned a diploma in Industrial Arts Teacher Education from Red River College as well as a Bachelor of Arts or Science degree and a Bachelor of Education degree from the University of Winnipeg.

The Industrial Arts/Technology Teacher Education-Accelerated program is designed for students who have already completed a Bachelor of Education degree.

The Industrial Arts/Technology Teacher Education-After Degree program is designed for students who have previously completed an undergraduate degree.

1. Home

2. Full-time Programs
3. Industrial Arts/Technology Teacher Education
4. Overview

SUPPORTS

Financial Aid and Awards

REGIONAL CAMPUSES

Peguis - Fisher River

CONTACT US

Student Service Centre - Full-time Programs
Phone: 204.632.2327
Toll-free: 800.903.7707
Email: register@rrc.ca
Hours and Locations

THE UNIVERSITY OF WINNIPEG

Updated August 2019 1 UWINNIPEG.CA
JOINT PROGRAM

INDUSTRIAL ARTS/TECHNOLOGY TEACHER EDUCATION

This is an integrated diploma/degree program offered by Red River College and The University of Winnipeg. The program develops the teaching and technical skills you require for teaching industrial arts and technology education programs in the public school systems.

Emphasis is placed on developing your knowledge and skills in key areas – manufacturing, power and energy, graphic communications, construction, computer applications – as well as in curriculum development and teaching methodology.

After you successfully complete the five-year program, you will receive a diploma in Industrial Arts/Technology Teacher Education from Red River College as well as a Bachelor of Arts or Science and a Bachelor of Education from The University of Winnipeg.

In addition to the regular five-year ***Integrated*** pattern, there is also a three-year ***After Degree*** pattern for those who have previously completed another undergraduate degree, and .a one-year ***Accelerated*** pattern for students who already hold a Bachelor of Education.

SAMPLE CAREERS

Graduates may find employment in the public school system.

SAMPLE COURSES – RED RIVER COLLEGE

Construction Technology – Introduction - This course exposes students to a complete survey of the construction industry. Students will explore this rapidly growing field through activity-oriented instruction, which includes the broad systems of construction, selected concepts in pre-construction, construction, post construction and considerations of future trends.

Graphic Communications Technology 1 Students will be introduced to Graphic Communications through drafting, printing, photography, graphics and other communication processes used in business and industry. Graphic Communications explores various methods of communication used to convey information in a variety of formats. Traditional practices will be explored as a foundation for the implementation of computer-based technologies used in the public school system. This course will cover communication theory, message analysis, sketching, drafting, introductory computer aided drafting (CAD), screen printing and an introduction to photography.

2

SAMPLE COURSES – UNIVERSITY OF WINNIPEG

THE SCHOOL SYSTEM: STRUCTURE AND DYNAMICS This course will focus upon the structure and functions of the public school system at local, provincial, and national levels. Emphasis will be on organizational, political, and legal aspects of the educational system as they relate to the classroom teacher.

INCLUSIVE APPROACHES TO TEACHING EXCEPTIONAL STUDENTS This course addresses the relevant theories, delivery systems, assessment, adaptive programming, family, and community involvement, and education services for children with mild to moderate cognitive, emotional, and behavioural special needs. Attention is paid to the mandated provincial curriculum and policies as well as professional, legal, ethical, and societal considerations.

STUDY PATTERN

Integrated:

Year 1-5 both UWinnipeg and RRC every year

After Degree:
Year 1-2 RRC
Year 3 UWinnipeg
Accelerated:
Year 1 RRC only (apply through Red River College)
REQUIRED HIGH SCHOOL COURSES
You must meet the entrance requirements for the Faculty of Education at The University of Winnipeg. If you do not meet the requirements, but are 21 years of age or older on or before December 31 in your year of admission, you may apply as a special admission student. See the University's Academic Calendar.
HOW TO APPLY
You must apply to The University of Winnipeg by March 1 for fall entry. For details and to apply online, please visit uwinnipeg.ca/apply
For more information contact a student recruitment officer at welcome@uwinnipeg.ca or 204.786.9844. In any case where the University's

Link: https://wmich.edu/academics/undergraduate/industrial-tech1

Main menu

Western Michigan University -USA

- **ACADEMICS**
- **ADMISSIONS**
- **RESEARCH**
- **GIVE**

Academics

Technology Education

Department of Family and Consumer Sciences

Western Michigan University's non-vocational Technology program will prepare you to teach industrial technology-type courses at the middle or secondary level. The program is similar to the vocational Technology program, but does not require you to document relevant work experience in the industrial area in which you would like to teach.

WMU's non-vocational Technology program is approved by the State Board of Education and North Central Accreditation for Teacher Education. It leads to a State of Michigan K-12 or Secondary Provisional Certificate, depending on the teachable major or minor.

Beyond the classroom As a non-vocational Technology student at WMU, you will be required to complete a full-semester internship under the mentorship of selected teachers in schools approved by the University. The internship is designed to prepare you not only for your role as a classroom teacher, but as a professional studying your own teaching practice. Both school and WMU faculty will work together closely to support and assist you as you progress through the semester.

After you graduate

Recent WMU graduates with degrees in non-vocational Technology are working as classroom teachers in the following areas:

- Auto tech
- Welding
- Construction trades
- Drafting

- Electronics

Among the organizations they work for are:

- Middle schools
- Junior high schools
- High schools
- Community colleges

Appendix-B

General Education Courses 1-13

Course Outlines

Introduction to Expository Writing – Expository Writing I

Course Code: CG-101

Semester: I **Credit Hours: 3**

1. Course Description

This course prepares undergraduates to become successful writers and readers of English. The course helps students develop their fundamental language skills with a focus on writing so that they can gain the confidence to communicate in oral and written English outside the classroom. The course is divided into eight units and takes a PBL (Project-based Learning) approach. Unit themes target the development of 21st century skills and focus on self-reflection and active community engagement. Course activities include lectures, group, pair and individual activities, as well as a series of required assignments, including reading and writing across various genres. Finally, the course prepares students for taking the next course in the sequence, 'Expository Writing II: Cross-cultural Communication and Translation Skills'.

2. Course Objectives

At the end of the course, the students will be able to:

1. Analyze basic communication skills and use them effectively in oral and written English
2. Develop skills as reflective and self-directed learners
3. Critically evaluate and review various types of texts and summarize them
4. Develop analytical and problem-solving skills to address various community-specific challenges
5. Intellectually engage with different stages of the writing process, such as: brainstorming, mind mapping, free writing, drafting and revision, etc.

3. Course Contents

Unit-I: Reading Skills

- Reading for writing
- Reading strategies
- Critical reading skills

Unit-II

- Sentence Structure
  - Word Class (forms)
  - Parts of a sentence (functions)

Unit-III: Overview of Common Writing Problems

- Subject-verb Agreement
- Common errors in the use of:
    - Verbs: subjunctive, causative, verbs of perception, etc.
    - Nouns: always singular, always plural, plural of singular nouns, etc.
    - Adjectives and adverbs: proper use of degrees, faulty comparison, etc.
    - Modifiers
        - Dangling modifier
        - Squinting modifier
- Sentence Fragment
- Run-on Sentences and Comma Splices
- Parallelism
- Collocation
- Redundancy and Wordiness

Unit-V: Punctuation

- Punctuation
- Capitalization

Unit-VI: Self-reflection

- Introduction to the steps of essay writing
    - Determining the type of essay and the topic
    - Creating an outline
    - Developing thesis statement
    - Introduction
    - Body
    - Conclusion

Unit-VII: Personalized Learning

- Learning preferences and strengths
- Significance and planning of an oral presentation

Unit VIII: Community Engagement

- Understanding local issues

- Writing letter to editor
    - Preparing
    - Drafting
    - Editing
    - Finalizing

4. Teaching-learning Strategies

Teaching will be done through lecture method with a combination of tasks/projects and presentations.

5. Assessment and Examinations

Assessment will be done as per university/department policy.

6. Textbooks

Nelson, G., & Greenbaum, S. (2018). *An introduction to English grammar*. Routledge.
Eastwood, J. (1994). *Oxford guide to English grammar*. Oxford University Press.

7. Suggested Readings

1. *Collin Cobuild English Grammar*. (3rd Edition). https://www.academia.edu/23703753/Collins_COBUILD_English_Grammar
2. Langan, J. (2013). *College writing skills with readings*. Tata McGraw-Hill Education. *http://library.lol/main/23DE6FE03A8848B047852766F91B1FD3*
3. Murphy, R. (2019). *English grammar in use book with answers and interactive ebook.* (5th ed.). Cambridge University Press.
4. Redman, P., & Maples, W. (2017). *Good essay writing: a social sciences guide*. Sage.
5. Straus, J., Kaufman, L., & Stern, T. (2014). *The blue book of grammar and punctuation* (11th ed.). Wiley. http://ngoaingu.vimaru.edu.vn/wp-content/uploads/documents/The_Blue_Book_of_Grammar_and_Punctuation-1.pdf
6. Turton, N. (1995). *ABC of common grammatical errors*. Macmillan Education.
7. Woods, G., Anderson, W. M., & Ward, L. J. (2020). *English grammar essentials for dummies* (Australian ed.). For Dummies.

Course Title: Cross-Cultural Communication and Translation Skills
Expository Writing II

Semester: II **Credit Hours: 3**

Course Code: CG-102

1. Course Description

The course introduces learners to cross-cultural communication and translation in the 21st century. It aims to make students aware of the challenges in communicating across cultures by developing cross-cultural awareness and translation skills. Students will develop awareness of issues related to cultural identity and the significance of the role language plays in translating verbal and nonverbal aspects of various cultures. Using hands-on training for translating from and to English, the students will practice with various genres—including academic, business, and literary texts— and evaluate the quality of these through application of theory, best practices, and technology. The skills acquired in this course will help students interact across cultures in English and national or indigenous Pakistani languages at a professional level and develop career skills through an inspiration toward lifelong learning.

2. Course Objectives

The objectives of this course are to:

- To raise students' awareness of the issues and challenges of cross-cultural communication and collaboration.
- To sensitize students to the key roles that translation skills play in a multilingual society like Pakistan.
- To improve the general English skills of students and to improve the specific language skills needed for translation work.
- To provide students with a background in translation theory appropriate to support both academic and everyday translation needs.

3. Course Contents

Unit-I: Cross- Cultural Communication and Translation Skills

- Cultural diversity in symbolic meaning
- Utilization of online resources
- Cultural wisdom
- Exploration of cultural differences through taglines of advertisements
- Cultural adaptation
- Translation techniques and strategies

Unit-II: Parts of The Biographical Profile as a Genre

- Selecting and writing about a famous person or celebrity
- Learning about the translation process
- Researching and reading bios
- Reading social media bios
- Translating Celebrity Writing Online
- Tools for Vocabulary Building and Translation
- Writing and Translating Media Bio

Unit-III: Translating Cultural Heritage through Folktales

- Cross- cultural awareness through folklore and translation
- Analysis of Pakistani folktales
- Translation applied to folktales and local stories transcription of a folktale [project work]
- Thick translation of a folktale
- Glossing the folktale
- Peer review of the glossed folktales writing and revising the draft
- Storytelling techniques; rehearsal of storytelling in class: class presentation

Unit-IV: Translation in the Business World: Product Descriptions

- Discussion on product descriptions
- Planning and drafting the project description
- Peer review
- Adding Visuals and Preparing the Final Format
- Class Presentation
- Final Revision and Proofreading

Unit-V: Email for Business Communication

- Email versus
- SMS Netspeak and Internet
- Slang
- Components of a formal email
- *Correcting emails drafting an email*

Unit-VI: Translating Academic Work

- Academic versus literary translation
- Translation discussion and practice
- Selection of text(s) for translation and review of translation tasks
- Translation work and peer review of translation work
- Finalization of group translation of academic material
- Groups present, post, or share their translation work.

4. Teaching-learning Strategies

Teaching will be done through lecture method with a combination of tasks/projects and presentations.

5. Assessment and Examinations

Assessment will be done as per university/department policy.

6. Textbooks

1. Newmark, P. (1988). *A Textbook of Translation.* New York: Prentice Hall.
2. Van der Molen, H. T., & Gramsbergen-Hoogland, Y. H. (2018). *Communication in organizations: Basic skills and conversation models*. Routledge.

3. Walsh, J. D. (2003). *The art of storytelling: Easy steps to presenting an unforgettable story*. Moody Publishers.

7. Suggested Readings

1. Brooks, R. (May 29, 2017). *The Challenges of Translating Literature*. https://k-international.com/blog/the-challenges-of-translating- literature/
2. Cheung, Y.P. M. (2007). On Thick Translation as a Mode of Cultural Representation. In Dorothy, K. & Kyongju, R. (Eds.), *Across Boundaries: international perspectives on translation studies* (pp. 22-36). Newcastle, UK: Cambridge Scholars Publishing.
3. Hertzberg, K. (n.d). 4 Smart Tactics for Sending Emails to Recruiters. Grammarly. Retrieved from: https://www.topre sume.com/career- advice/tactics-to- email- recruiters
4. Newmark, P. (1988). *A Textbook of Translation.* New York: Prentice Hall. (Chapter15)
5. Norbert. (August 2, 2018). The 10 Key Elements of Clear and Professional Emails. EmailStrategy. Retrieved from: https://www.voilanorbert.com/blog/clear-and-professional- emails/
6. Stitt, R. (Feb 23, 2016). *Translation Essentials: Academic Translation.* https://www.ula tus.com/translat ion- blog/translation-essentials- academic- translation/
7. Toegel, G. & Barsoux, J. L. (June 08, 2016). 3 situations where cross-cultural communication breaks down. *Harvard Business Review*. Retrieved from: https://hbr.org/2016/06/3- situations-where-cross-cultural- communication- breaks-down/

Course Title: **Critical Reading and Academic Writing**
Expository Writing-III

Semester: III **Credit Hours: 3**

Course Code: CG-201

1. Course Description

This is an advanced level course. The main objective of the course is to enable the students to improve students' writing skills at advanced level to show proficiency in any kind of academic and professional setting. The course will improve students' expository writing skills such as composing different types of essays, long reports, maintaining cohesion and coherence in their writing. Similarly, the course will also focus on the use of various format for academic writing such as APA. The students will also be trained in identifying, comprehending, writing, and proofing of different writing genres used in academic and professional settings. Moreover, they will also be equipped in changing opinions to facts, using hedges, and suitable vocabulary, etc.

2. Course Objectives

The objectives of this course are to:

1. Enable the students to overcome common language errors in writing.
2. Help students write formally.
3. Train students to change opinions into facts.
4. Help them to cite experts using different formats.
5. Make students aware of various types of academic and professional writing.
6. Expose students to different types of writing formats.

3. Course Contents

Unit -I: Information Literacy: Reading and Writing in Academy

- Understating the concept of 'Think Tank'
- Understanding the IMRaD structure of a research report
- Library catalogue and digital resources
- Techniques for skimming and scanning to academic sources
- Prewrite
- Evaluation of the quality of academic source
- Pre-writing activities

Unit -II: Persuasive Essays, Argumentation, and Engaging Sources

- Evaluation of the strength of written arguments
- Demonstration of the skills to compile an annotated bibliography
- Understanding the purpose of the literature review
- Analysing citations
- Building an argument and constructing a claim
- Summarizing texts

Unit -III: Critical Reading and Writing: Literature Reviews and Narrative Structure

- Word stress in English
- Think tank presentation— extemporaneous speech
- What is a literature review?
- Digital reference management tools
- Write the first draft of a literature review
- Peer review of literature review
- Data collection planning
- Methods section preview

Unit -IV: Report Writing

- Understanding a results section
- Writing a results section
- Writing a discussion section
- Drafting a research report

Unit -V: Writing Introductions, Conclusions, and Abstracts

- Note taking-introductions
- Think tank writing peer review of introductions
- Revise your introduction
- Note taking-conclusions
- Reading of sample conclusions
- Peer review of conclusions
- Revision of conclusion
- Oral presentations and feedback
- Individual reverse outlining
- Note taking abstracts
- Reading of sample abstract
- Peer review of abstract
- Revision of abstract
- Annotated bibliography check-in

Unit-VI: Proofreading

- Proofreading sample passages
- Justifying the changes made
- Proofreading workshop

4. Teaching-learning Strategies

Teaching will be done through lecture method with a combination of tasks/projects and presentations.

5. **Assessment and Examinations**
   Assessment will be done as per university/department policy.

6. **Textbooks**
   1. Bailey, S. (2017). *Academic writing: A handbook for international students*. Routledge.
   2. Warner, J. (2019). *The writer's practice: Building confidence in your nonfiction writing* (Illustrated ed.). Penguin Books.

7. **Suggested Readings**
   1. Ewald, T. (2020). *Writing in the Technical Fields: A Practical Guide* (3rd ed.). Oxford Univ Pr.
   2. Kansas State University. (2020). Research paper Rubric. Assessment of Student Learning. https://www.k- state.edu/assessment/toolk it/measurement/resrubric.pdf
   3. Langan, J. (2013). *College writing skills with readings*. Tata McGraw-Hill Education.
   4. Manninen, S., Turner, E., & Wadsö-Lecaros, C. (2020). *Writing in English at University: A Guide for Second Language Writers*. (Lund Studies in English). Centre for Languages and Literature, Lund University. https://portal.resea rch.lu.se/portal/file

Course Title: Islamic Studies

Credit Hours: 3

Course Code: CG-202

1. **Course Description**

Islam and its ethical principles are comprehensive and universal. However, in general, people think Islam is like other religions, a matter of rituals, ceremonies, and offerings. This course briefly presents different aspects of the Islamic vision of life. The course will provide the students with an opportunity for learning the Islamic viewpoint on contemporary issues and challenges including knowledge of Islamic beliefs, ethics, economics, politics, civilizations, culture, and society. The course while sharing the Islamic vision will help students in practical application of Islamic way of life. This course is a university graduation requirement and follows guidelines of the HEC for Islamic Studies.

2. **Course Objectives**
   Upon successful completion of the course, the students will be able:
   1. To understand the Islamic vision of life
   2. To learn the main features of Islamic way of life
   3. To know how to develop a moderate Islamic personality
   4. To identify major ethical issues faced by the Muslim society and their solutions
   5. To understand the concept of a meaningful and successful life

3. **Course Contents**

Unit I: Introduction to Islamic Vision of Life

- What is a meaningful life?
- Understanding the Purpose/Way of Life
- What is the Islamic vision of life?
- Unity in Life (*tawhid*) and its impact
- Islam: A Complete way of Life (*din, nizam-e-hayat*)
- Islamic identity and world view

Unit II: Meaning and role of ethics in building a holistic personality

- Ethics at individual and social level
- Common ethical concerns
- Universal Ethical values of Islam
- Ethics in an age of science and technology (can everyone decide what is good or bad)

Unit III: Islamic Ideology and its Importance

- Islamic view of God (Allah *s.w.t.*)
- Islamic View of Universe
- Islamic concept of man as Allah's vicegerent on earth
- Characteristics & impact of Islamic ideology

Unit IV: Fundamental Beliefs of Islam

- Definition of *Iman* and Articles of *Iman*
- Building and Strengthening *Iman*
- Unity of One God (*Tawhīd*)
- Prophet-hood
- Hereafter
- Impact of Fundamental Beliefs on Human Behavior (*dunya* and *al-Akhirah*)

Unit V: Concept of Worship & Rituals in Islam

- What is worship?
- Conventional understanding
- Monasticism (*rahbaniyyah*)
- Concept & objectives of Islamic *'ibadat* (worship)

Unit VI: Pillars of Islam: *Kalimah Tayyeba, Salāt, Sawm, Zakāh, Hajj*

- Objectives & Purposes
- Impact on character
- Personality Development
- Collective Benefits

Unit VII: Ethical System of Islam

- Meaning of *akhlaq*
- Universality of Islamic ethics and morality
- Universal role model of morality (*uswah hasanah*)

Unit VIII: Basic Features of Modern ideologies

- Materialism
- Secularism
- Democracy
- Nationalism
- Humanism

Unit IX: Characteristics of Islamic Civilization

- The divine origin of civilization and culture.
- Foundations of civilization in Islam
- Local and particular cultures and civilizations
- Universality of Islamic Civilization

Unit X: Social Ethics

- Importance of family as foundation of social system
- Peace & harmony as a major objective

Unit XI: Ethics & Economy

- Characteristics of Islamic economic order
- Socio-Economic Justice
- Business Ethics in Islam

Unit XII: Islam & Political Ethics

- Islam & Democracy
- Islam & Socialism
- Islam & Secularism

- Islam & Kingship

4. Teaching-learning Strategies

Teaching will be done through lecture method with a combination of tasks/projects and presentations.

5. Assessment and Examinations

Assessment will be done as per university/department policy.

6. Textbooks

1. Ahmad, K., (2017).اسلامی نظریہ حیات [*The Islamic Vision of Life*] (Islamabad: Institute of Policy Studies, (2nd ed.)
2. M. Asad. (1996). *What do we mean by Pakistan; towards and Islamic contribution*.
3. Sadrud dīn Islāhī, (1996). *Islam at a Glance*, (7th ed.). Lahore: Islamic publications ltd.
4. Amin Ahsan Islahi, اسلام ایک نظر میں, Lahore

7. Suggested Readings

1. Ahmad, K. (2018). *Islam: its meaning & message*, (Islamabad: Institute of Policy Studies).
2. Murad, K. (1985). *Let us be Muslims*, Leicester: The Islamic Foundation, United Kingdom.
3. Al-Ghazali, M. (2006). *Muslim's character,* (Riyadh: Dar al-Salam Publishers.

Course Title: Pakistan Studies

Course Code: CG-204 **Credit Hours: 3**

1. Course Description

This Pakistan Studies course provides a background on the Pakistan Movement and the political development after its inception. It will also cover the salient features of Pakistan such as its land, economy, human development, and domestic, international, and current affairs. The course aims to introduce students to the history of the region comprising Pakistan, provide an overview of contending perspectives on the origins of the country, and examine its politics, society and culture. The course will discuss foundation of ideology of Pakistan, ideological clash between Muslims and other non-Muslims communities of subcontinent specially Hindus. History that reveals when the Muslims entered in the South Asia for trading them, with the trade, started preaching of Islam also and the rays of Islam began to spread over this sub-continent.

2. Course Objectives

Some objectives of this course are given below:

1. To emphasize learning of various concepts regarding Pakistan Studies in a way that it encourages observation and creativity in the students.
2. To promote and understand Ideology of Pakistan, struggle of Muslims for emergence of an ideological state, and efforts for achieving the goals of Islamization.
3. To create awareness about the contemporary socio-political and economic patterns of state and society.
4. To create awareness in relation to Pakistan's International relations.

3. Course Contents

Unit I: Historical Perspective of Pakistan

- Ancient Civilizations: Mehargarh, Indus Valley and Gandhara Civilizations
- History of Region / Province
- Muslim Rule in the Subcontinent (712-1526)
- Muslim Rule in the Subcontinent (1526-1857)

Unit II: British Raj and its Impact upon India

- Advent of East India Company
- British Policies for India
- Colonial Impact on Muslims
- Education, Social and Financial Policies of Britain's

Unit III: Ideology of Pakistan & its Political Background

- History of Muslims in Sub-continent
- What is Ideology
- Importance of Ideology
- Some Basic Concepts I.e. Sovereignty and its types, Civilization, Culture.
- Foundation of ideology of Pakistan
- Ideological clash between Muslims and Hindus/non-Muslims

Unit IV: Two Nation Theory

- Islamic ideology is the philosophy underlying the Two Nations theory
- Pakistan is a state founded on ideological basis and not on the territorial grounds
- Political differences
- Social difference
- Economic differences

Unit V: Sir Syed Ahmad Khan, Iqbal, Jinnah and Ideology of Pakistan

- Relation among Sir Syed, Jinnah, Iqbal and Ideology of Pakistan
- The role of *Ali Garh* Movement for the uplift of Muslim
- Analyze socio-political and economic system of West and Islam with reference to Iqbal and Jinnah's Thoughts
- Formation of Pakistan, struggle for Muslims political and social rights.
- Iqbal, Jinnah and the Concept of Nationalism
- Jinnah's Vision of Pakistan
- Jinnah Concept of welfare state

Unit VI: Role of Ulama and Muslims Institutions for the protection of Muslim

- Hindu different movements and its role against the minorities especially against Muslims i.e. Aarya Samajh, Brahmo Samajh, Hindu Mahasbha etc.
- Role of Muslims institutions and Ulama in supporting ideology of Islam and Pakistan
- Role of Deoband, Nadva-tul Uluma, Anjuman Himayat e Islam and Sindh Madrasah-tul Islam
- How they support the cause of Pakistan
- Formation of political parties i.e. JUH, INC and AIML and their approaches towards Nationalism.
- Mulana Abul Kalam Azad, Ashraf Ali Thanvi, Mulana Hussain Ahmad Madani and their Ideological approaches.

Unit VII: 1906 New Political Party All India Muslim League (AIML)

- Need for a political party for Muslims
- Role of AIML, and its contribution in sub-continent politics for the Muslims
- How AIML protected Muslims political, social and economic rights in sub-continent
- Its role in the formation of Pakistan
- Its strong advocacy for the establishment of a separate Muslim state.
- To Discuss its need, reason and the reactions of India National Congress against AIML

Unit VIII: Nehru Report 1928, Jinnah's Fourteen Points 1929 & Iqbal Address 1930

- Reason and Need of Nehru Report 1928
- Why the report proposed new dominion status constitution for India
- Comparative study of Nehru report and Jinnah Fourteen Points
- To discuss and analyze the need and reason of Jinnah Fourteen Points
- How Jinnah Fourteen Points safeguarded the political rights of Muslims
- To discuss Jinnah's aim to get more rights for Muslims
- The need of 1930 Allahabad Address
- Key Points of Allahabad Address 1930

Unit IX: Initial Problem of Pakistan and Important Events

- Constitution making
- Unfair Boundary Distribution
- Division of Military Assets
- Division of financial assets
- Economic Problems
- Issue of national language
- Energy issues
- Kashmir Dispute
- Canal Water Dispute

Unit X: Aims and Objectives of Pakistan and Objective Resolution

- Salient features of Objectives Resolution
- Why it was adopted by the Constituent Assembly of Pakistan on 12 March 1949
- How Objectives Resolution discuss the ideology of Pakistan and democratic faith of Islam
- Speech of Liaquat Ali Khan to Constituent Assembly of Pakistan on March 12, 1949.
- Criticism on Objective Resolution by minorities
- Aims and objective of creation of Pakistan
- Importance of Civilization and Muslims has to protect their culture and civilization as Iqbal mentioned in his speech. Why?

Unit XI: Struggle for the Islamization in Pakistan and 22 Points of Ulama

- Why was the need of Uluma summit?
- The role Ulamas for Islamization to implement Pakistan and Islamic Ideology
- What was that 22 principles (formulated by the said summit)
- How it will be followed by the constitution for Islamic State

Unit XII: Salient Feature of 1973 Constitution

- A Written Constitution
- Flexibility
- Republican Form of Government
- Federal Form of Government
- Parliamentary Form of Government
- Bicameral Legislature
- Fundamental Rights
- Pakistan to be a Welfare State
- Islamic Provision of 1973 Constitutions
- 18th Amendment and provincial autonomy

Unit XIII: Administrative Structure and Politics of Pakistan

- Executive
- Legislation

- Judiciary
- Status of President
- Provincial government
- Governors
- FATA and PATA reforms
- Major political parties and its role in Pakistan

Unit IVX: Challenges and Problem for Pakistan in Present & Future

- Poverty
- Illiteracy
- Poor health condition
- Unemployment
- Corruption
- leadership
- Future challenges for Pakistan i.e. Pak-Indo relations, counter terrorism and other Social, economic and political challenges for the state.

Unit VX: Economy of Pakistan

- Initial problems
- Decade of development (1960)
- Nationalization of Economy
- IMF programs and its impact on economy of Pakistan
- China-Pakistan Economic Corridor (EPEC)

4. Teaching-learning Strategies

Teaching will be done through lecture method with a combination of tasks/projects and presentations.

5. Assessment and Examinations

Assessment will be done as per university/department policy.

6. Textbooks

1. Ahmad, I. (2010). *Allama Iqbal, Quaid e Azam aur Nazrya e Pakistan,* Maktaba Khuddam ul Quran Lahore.
2. Farooqi, Y. M. (2005). *Tasawar e Pakistan Baniyan Pakistan Ki Nazar Me*, ed, (Sharia Academy IIU Islamabad.
3. Iqbal, J. (2005). *Ideology of Pakistan*, (Sang-e-Meel Publications.
4. Islahi, A. A. (2006). *Islami Riasat,* Dar al Tazkeer Lahore.
5. Mahmood, S. (2015). *Iqbal, Jinnah aur Pakistan*. Sang-e-Meel Publications.
6. Saleem, M. (1985). *Tarikh Nazriya Pakistan,* (Idarah Taleemi Tahqeeq.

7. Suggested Readings

1. Ahmad, K. (1969). *Nazriya-e-Pakistan aur Islam* (The Pakistan Ideology and Islam), Karachi, Maktaba Nursi, 1969.
2. Akbar, S. Z. (2000). *Issue in Pakistan's economy*. Oxford University Press.
3. Farooqui, R. M. (2013). *The political Thought of Maulana Mawdudi*, (PhD diss., Osmania University India.
4. Haq, N. (1993). *Making of Pakistan*: *The military perspective*. National Commission on Historical and Cultural Research.
5. Muhammad Wa. (1989). *Pakistan under martial law*. Vanguard.

6. Syed Abul A'la Maududi, *Masala e Qumiat* (For Book Review)
7. Syed Abul A'la Maududi, *Tehreek e Azadi aur Muslman*
8. Wajid, M. & Ahmad, W. (2018). *Mulana Maududi, Islam and Ideology*." *Al Azhar* 4, No. 1.

Course Title: **Fine Arts**
Semester: II **Credit Hours: 3**

Course Code: CGAH-106

1. Course Description

The course aims to help the students increase their proficiency in Arts by enhancing their knowledge in the subject. This course will develop and broaden critical and creative thinking skills, understanding of and appreciation for the visual arts and culture and increase participant 's proficiency in visual art techniques and processes. Students will get an opportunity to explore various visual art forms and techniques in this course through the elements and principles of art and design. Through this course students will explore different approaches to painting and painting techniques using a variety of media. Emphasis will be placed on the elements of art and design with an emphasis on colour and composition. Students will develop technical skills and personal style. A variety of subject matter will be explored e.g. still life, interior/exterior, landscape and the figure. The craft section participants will explore various approaches to clay construction, while applying the elements and principles of design to create three-dimensional form. Emphasis will be on hand building methods. Various decorating techniques will be stressed with greater opportunity to apply creative and critical thinking skills to their forms e.g., carving, etching, texture in 2D and 3D structures etc.

2. Course Objectives

Upon the successful completion of this course the students will be able to:

1. Use tools and materials in art more skillfully
2. Use of an art journal on their own artistic ideas and thoughts for refining their teaching as an art teacher
3. Recognize and appreciate artists, art styles, and artwork
4. Reflect and participate in art critiques as a critic and as an artist
5. Initiate independent projects that allow personal interpretation and self-expression
6. Identify links between art and other school subjects

3. Course Contents

Unit 1: Introduction to Arts, Crafts& Calligraphy

- What are Arts, Crafts and Calligraphy?
- The Role of teacher in teaching art
- Influence of the arts in children's development
- Calligraphy- The Emergence of Islamic calligraphy
- Ceramics and Sculpture
- Puppetry in Pakistan Mughal (Mughal School)

- Post Mughal (Pahari School)

Unit 2: History and Culture

- Indus Civilizations
- Exploration of history through a museum visit Art and Architecture (From Indus to Mughal)
- Islamic Art and Calligraphy (Introduction of art, craft and calligraphy / origin from Persian Artist and their Calligraphy)
- Pakistani Calligraphers (Anwar Jalal Shimza, Rasheed Butt, Hanif Ramy, Zahoor-ul-Ikhlaq,Arshad, Sadqain, Shakir Ali, Gul Gee, Aslam Kamal)
- Review of this unit

Unit 3: History and Culture

- Introduction to Cubism Understand the Cubism
- Pakistani Artist's (Worked in Realism e.g. Shakira Ali and Mansoor Rahi)
- Introduction about Realism
- Pakistani Artist's work in Realism (Ali Imam, M. Husain, Hanjra, Khalid Iqbal, Ana Molka) Hands-on Activities
- Abstraction
- Origin and History of Abstract Art
- Explore the work of Pakistani Artists in abstract

(Ahmed Pervaiz, Lubna Latif, Maqsood Ali, Anwar Maqsood, Hameed Ali)

- Hands on Activities
- Indigenous Art
- Pottery, Ceramics, Textile etc. Hands-on Activities
- Art Across the Curriculum
- Ideas to integrate art with languages, science, social studies, mathematics etc.

Teachers will be facilitated to learn how illustrations, drawings and craftwork can be used to understand and express the concept of science, mathematics, social studies and skills in languages

- Hands on Activities and Conclusion

Unit 4: Elements of Art & Principle of Design

Understanding elements of art (line, shape, color, texture, space and volume)

- The importance of lines and its use in artwork
- Kinds of lines
- Use of Colors (Color Wheel, Tints, Tones, and Shades)
- Use of space and value in 2D and 3D art Texture (Natural and Man-made)
- Introduction of Principles of Design (Unity, Variety, Balance, Contrast, Emphasis, Pattern and Proportion)

- Drawing/ Technique of rendering
- Still Life
- Painting
- Printing
- Pattern Making
- Shapes- Organic and Geometrical Shapes
- Sculpture
- Landscape
- Stick Drawing
- What is Assessment in Art Curriculum?
- How and why we assess Creativity.
    - Review the Recommendations proposed in the national curriculum grades
- Design Rubric/ Checklist for Portfolio
- Conclusion and Review of whole unit

Set criteria for Presentation/ Display/ Peer and Self- Assessment etc

4. Teaching-learning Strategies

Teaching will be done through lecture method with a combination of tasks/projects and presentations.

5. Assessment and Examinations

Assessment will be done as per university/department policy.

6. Textbooks

1. Barnes, R. (2002). Teaching art to young children 4-9: New York: Routledge.
2. Brelsford, T. (2005). The Arts and the Creation of Mind. International Journal of Practical Theology, 9(1), 160.
3. Eisner, E. W. (2002). The Arts and the Creation of Mind: Yale University Press.
4. Lancaster, J. (2002). Art in the primary school: Routledge.
5. Jenkins, P. D. (1980). Art for the fun of it: A guide for teaching young children: Simon and Schuster.
6. Gentle, K. (1993). Teaching painting in the primary school. UK: Continuum International Publishing Group.
7. Dowling, M. M. (1992). Education 3-5. UK: SAGE.
8. Matthews, J. (1994). Helping children to draw and paint in early childhood: Children and visual representation. 0-8 Series, Series Editor Tina Bruce.

7. Suggested Books

1. Gura, P. (1996). Resources for Early Learning: Children, Adults and Stuff. London: Hodder & Stoughton.
2. Tambling, P. (1990). Performing arts in the primary school: Basil Blackwell.
3. Fisher, R. (1991). Teaching juniors. UK: Blackwell.
4. Vandal, S. (2004). Art Education in Pakistan: A case study of bringing art to school children at the informal level.
5. Vandal, S. (2004). Art Education in Pakistan: A case study of bringing art to
6. school children at the informal level, UNESCO Regional Expert Symposium on Arts Education in Asia, Hong Kong.

Course Title: Science, Technology and Society

Semester: II **Credit Hours:** 3

Course Code: **CGSS-107**

Lecture: 2
Duration of Lecture: 1 hour & 30 Minutes

Introduction of the Course

This course offers an introduction to Science, Technology and Society. STS is the interdisciplinary study of how science and technology form society and the environment, and conversely how society and the environment shape science and technology, from various perspectives in the humanities and social sciences: history, anthropology, sociology, philosophy/ethics, and political science/public policy. This course is to be included in the pool of general courses of Associate Degree Program under semester system.

Science, technology and society (STS), also referred to as science and technology studies, is a branch or offspring of science studies. It considers how social, political, and cultural values affect scientific research and technological innovation, and how these, in turn, affect society, politics and culture.

Course Objectives

1. To deepen awareness of social, cultural, and epistemic dynamics of science and technology
2. To communicate in sophisticated ways about these issues, especially orally and in writing
3. To become familiar with select foundational texts in the field of STS
4. To explore key themes in STS from diverse disciplinary and interdisciplinary perspectives
5. To be exposed to faculty from across the Pakistani College who do STS-related work

- **Contents**

Unit-1 **Health, Biology, and Society**

Genetics and Society

Genetic Discrimination

Genetics and Society

Genetically Modified Food

Unit-2 **Environment and Society**

Environmental Justice
Global Warming: Scientific Data

Renewable Energy

Energy Conservation and Building Design
Post-Industrial Agriculture
Recycling and Zero Waste

Unit-3 **Engineering, Design, and Society**

Nanotechnology
Engineering Ethics
Universal Design and Social Difference

Future Vehicles: Hydrogen or Electric?
Future Fuels: Biofuels
Urban Design and Infrastructure

Unit-4 Information and Society

Intellectual Property and the File Sharing Controversy
The Open-Source Movement
The Media Reform Movement

Unit-5 Science and the University

The University and Its Public Mission
Discrimination and Diversity in Science and Innovation

- **Teaching-learning Strategies**

Teaching learning strategies will be selected by the teacher according to the determined objectives and nature of content.

- **Assessment and Examinations**: As per University Rules

Semester assignments 25%

Mid Semester Test 35%

Final Semester Test 40%

- **Textbooks**

Title	Science, Technology, and Society: Education A Sourcebook on Research and Practice. *Volume 6 of Innovations in Science Education and Technology*
Editors	David D. Kumar, Daryl E. Chubin
Edition	illustrated
Publisher	Springer Science & Business Media, 2012
ISBN	940113992X, 9789401139922
Length	308 pages

Title	Education for a Sustainable Future: A Paradigm of Hope for the 21st Century
Editors	Keith A. Wheeler, Anne Perraca Bijur
Publisher	Springer Science & Business Media, 06-Dec-2012
Length	280 pages

Title	New Developments in Science and Technology Education © 2016
Editors	**Riopel**, Martin, **Smyrnaiou**, Zacharoula (Eds.)

- **Suggested Reading**

1. All readings are available electronically. We will show you how to access them in the first class. You are responsible for all readings listed on this syllabus. You should complete the readings before the day on which they are assigned.
2. Don Ihde, (2009). *Postphenomenology & Technoscience: The Peking University Lectures*. Albany: SUNY Press.

3. Peter-Paul Verbeek. (2005). What Things Do: Philosophical Reflections on Technology, Agency, and Design. State College: Penn State University Press.

4. Robert Rosenberger. (2012). "Embodied Technology and the Dangers of Using the Phone While Driving." *Phenomenology & the Cognitive Sciences* 11: 79-94.

Course Title: **HUMAN RESOURCE MANAGEMENT**

Course Code: CGSS-108

Course Description:

Due to study of this subject, the students will be able to develop the management skill and understanding the basic principles of management and human relation and develop psychological approach to solve the labor problems.

- Semester: VII
- Credit Hours: 3+1
- Pre-requisites course requirements/ skills NA

Course Objectives

1. To enable the students to understand the HR Management and system at various levels in general and in certain specific industries or organizations.
2. To help the students focus on and analyses the issues and strategies required to select and develop manpower resources
3. To develop relevant skills necessary for application in HR related issues
4. To Enable the students to integrate the understanding of various HR concepts along with the domain concept to take correct business decisions

Learning Outcome

After successfully completing this program, you should be able to:

- Effectively manage and plan key human resource functions within organizations
- Examine current issues, trends, practices, and processes in HRM
- Contribute to employee performance management and organizational effectiveness
- Problem-solve human resource challenges
- Develop employability skills for the Canadian workplace
- Develop effective written and oral communication skills

Chapter 1 The Role of Human Resources

1.1 Human Resource Management Day to Day
1.2 What Is Human Resources
Learning Objectives
1.2.1 What Is HRM?
Human Resource Recall

5.4.2 Interview Questions
Human Resource Recall
5.4.3 Interview Process
Human Resource Recall
5.5 Testing and Selecting
Learning Objectives
5.5.1 Testing
5.5.2 Selection Methods
5.6 Making the Offer
Learning Objectives
Key Takeaways
Exercise
5.7 Cases and Problems

COURSE CONTENTS

UNIT-I

1. KNOW INDUSTRIAL PSYCHOLOGY.

1.1 Describe brief history if industrial psychology.
1.2 Describe in detail definition of industrial psychology.
1.3 State nature and scope of industrial psychology.
1.4 Elaborate the management skills.

2. KNOW LEADERSHIP.

2.1 Define leadership.
2.2 Describe types of leadership.
2.3 State qualities of a good leader.

3. UNDERSTAND MOTIVATION.

3.1 Define motivation.
3.2 Describe financial and non-financial motives.
3.3 Explain conflict of motives.

4. KNOW MORALE.

4.1 State importance of morale.
4.2 Describe development of morale.
4.3 State the method of measurement of morale.

5. UNDERSTAND HUMAN ENGINEERING.

5.1 Explain importance of human engineering in the industry.
5.2 Explain man-machine system.
5.3 Explain strategy for making allocation decisions.

6. UNDERSTAND INDUSTRIAL FATIGUE AND BOREDOM.

6.1 Define fatigue and boredom.
6.2 Describe psychological causes of fatigue and boredom.
6.3 Describe objective causes of fatigue and boredom.
6.4 Explain measures to prevent fatigue and boredom.

7. UNDERSTAND INDUSTRIAL ACCIDENTS.

7.1 Explain psychological causes of industrial accidents.
7.2 Explain objective causes of industrial accidents.
7.3 Explain measures to prevent industrial accidents.

8. UNDERSTAND INDUSTRIAL PREJUDICE.

8.1 Define prejudice
8.2 Explain causes of industrial prejudice.
8.3 Explain remedies of industrial prejudice.

9. UNDERSTAND THE SIGNIFICANCE OF PUBLIC RELATIONS.

9.1 Explain importance of public relations.

9.2 Explain functions of public relations.

10. UNDERSTAND THE NEED FOR GUIDANCE AND COUNSELLING.

10.1 State importance of guidance and counselling.

10.2 Explain the role of guidance and counselling in choosing the job.

10.3 Describe help of guidance and counselling during service.

11. UNDERSTAND JOB EVALUATION.

11.1 Explain importance of job evaluation.

11.2 Explain methods of job evaluation.

11.3 Explain job satisfaction.

11.4 Explain work simplification.

12. UNDERSTAND INDUSTRIAL MANAGEMENT.

12.1 Define management.

12.2 State functions of management.

12.3 Enlist subdivision of management.

12.4 Explain objectives of industrial management.

13. UNDERSTAND TRAINING AND ITS EFFECTS.

13.1 Describe the recruitment procedure of employees in an industrial concern.

13.2 Explain training.

13.3 Identify the kinds of training.

13.4 Explain the effects of training on production and product cost.

14. UNDERSTAND THE EFFECT OF WORKING CONDITION ON EFFICIENCY.

15.1 Explain importance of working condition.

15.2 Describe air-conditioning, ventilation, lighting and noise.

15.3 State the effects of good working conditions on efficiency
and per unit cost.

15. UNDERSTAND TIME AND MOTION STUDY.

15.1 Explain the concept.

15.2 Describe the importance of work study.

15.3 Explain the sequence of motion study.

15.4 State the principles of motion study.

15.5 Describe the steps for carrying out time study.

15.6 Explain the method of determination of operations time.

16. UNDERSTAND THE METHODS OF QUALITY CONTROL.

16.1 Define quality control

16.2 State the advantages of quality control.

16.2 Explain methods of quality control.

17. UNDERSTAND THE ROLE OF FOREMAN IN AN INDUSTRIAL UNDERTAKING.

17.1 Explain ability of the foreman.

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17.2 Enlist duties of foreman.

17.3 Describe functions of foreman as middle management.

Assessment and Examinations

Assessment will be done as per university/department policy.

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.

2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Books Recommended:

1 C.S. Meyers, Industrial Psychology, Oxford University Press, London.

2. Smith Wakley, Psychology of Industrial Behaviors, Mc-Graw Hill, New York.
3. Ghulam Hussain, Nizamat-e-Sanaat Aur Insani Rawabat, Ilmi Kitab Khana, Urdu Bazar, Lahore.
4. Andrew R. Megill, The Process of Management William M New Man.
5. Richard N Omen, Management of Industrial Enterprises.

Public Health

Semester: I **Credit Hours: 3**

Course Code: CGNS-105

1. Course Description

The course, Public Health, introduces the major concepts of public health and the determinants of health status in communities. The course emphasizes the ecological model that focuses on the linkages and relationships among multiple natural and social determinants affecting health. In addition to providing basic essential knowledge of disease prevention and health promotion aspects of public health, it provides a valuable foundation for subsequent health sciences and public health studies. The goal of public health is to understand why and how different populations carry different kinds and amounts of disease burden, and to use that knowledge for improving health by preventing disease. The course will build a sense of community and instill a public health mindset amongst students, and it will lay the foundation for students to work effectively as public health professionals on inter-professional teams.

2. Course Objectives

The objectives of this course are:

1. To discuss the evaluation of global trends affecting health, including communicable and non-communicable disease as well as the health impact of different environmental and lifestyle factors.
2. To apply basic public health concepts to the theoretical management of public health problems, including disease prevention, health promotion, health economics and policy, as well as critically compare opposing viewpoints in these fields.
3. To impart vivid knowledge of basic health concepts related to public.
4. To make aware to the students about various diseases and its precautions.
5. To spread general awareness amongst the students to promote hygienic ways of livings within the communities and across the communities as well.

3. Course Contents

Unit-I: Course Introduction

- What is public health?
- The role of data in public health
- Concept of health
- Dimensions of health
- Definition of health
- Health spectrum
- Determinants of health
- Responsibility of health
- Indicators of health
- The biomedical basis of public health
- Do people choose their own health?
- The future of public health

Unit-II: Diseases, its Nature and Preventions

- Concept of disease
- Iceberg of disease phenomenon
- Concept of causation
- Levels of prevention

Unit-III: Introduction to Personal Hygiene

- Handwash
- Eye hygiene
- Hair hygiene
- Body hygiene
- Oral hygiene
- Nails and cuticles
- Feet and shoes
- Protection from noise and UV Light
- Control of foul odour

Unit-IV: Role of personal hygiene in communicable and non-communicable diseases

- Types of cleanliness (intrinsic & extrinsic)
- Cleanliness and religion
- Prevention of cough cold and other contagious disease
- Smoking and protecting rights of others
- Personal hygiene at home
  - Clothes
  - Kitchen
  - Washroom

Unit-V: **Health Policy**

- Pakistan Health Policy 2009
- Health Financing
- Stewardship
- History of Health Policy in Pakistan
- Determinants of health policy

4. **Teaching-learning Strategies**

   Teaching will be done through lecture method with a combination of tasks/projects and presentations.

5. **Assessment and Examinations**

   Assessment will be done as per university/department policy.

6. **Textbooks**

Schneider, M. J. (2020). *Introduction to public health*. Jones & Bartlett Learning.
Smith, V. S. (2008). *Clean: a history of personal hygiene and purity*. Oxford University Press.
Turnock, B. J. (2006). *Public health: Career choices that make a difference*. Jones & Bartlett Learning.

7. Suggested Readings

1. Basch, P. F. (1999). *Textbook of international health*. Oxford University Press.
2. Coughlin, S. S. (1997). *Ethics in epidemiology and public health practice: Collected works*. Quill.
3. Detels, R. (Ed.). (2015). *Oxford textbook of global public health* (Vol. 2). Oxford Textbook.
4. Detels, R., Beaglehole, R., Lansang, M. A., & Gulliford, M. (2011). *Oxford textbook of public health.* Oxford University Press.
5. Dicker, R. C., Coronado, F., Koo, D., & Parrish, R. G. (2006). *Principles of epidemiology in public health practice; an introduction to applied epidemiology and biostatistics*.
6. Link, B. G., & Phelan, J. (2010). Social conditions as fundamental causes of health inequalities. *Handbook of medical sociology*, *6*, 3-17.
7. Lubkin, I. M., & Larsen, P. D. (Eds.). (2006). *Chronic illness: Impact and interventions*. Jones & Bartlett Learning

Course Title: **Environmental Sciences**

Semester: II **Credit Hours: 3**

Course Code: CGNS-103

1. Course Description

The aims of this course are to develop human resource equipped with knowledge of modern challenges of environment. The students will be trained to mitigate the impacts of climate change or adapt necessary measures and they are imparted knowledge about an attitude to contribute to development of sustainable lifestyle in the society and develop a green economy.

2. Course Objectives

The main objectives of the course are to:

1. Enable students to learn how to analyze and assess environmental problems its interrelationships with other systems of the society
2. Equip student with the knowledge and skill necessary for pollution abatement, environmental conservation, management of natural resources and making path to sustainable development
3. Impart skills to carry out projects on various cross-cutting aspects of environmental issues

3. Course Contents

Unit I: Basic Principles

- Convergence of ecology with economic and sociology to evolve as environmental science,
  - nature, and history
  - scope and the contribution to society

Unit II: Environmental aspects

- Physic-chemical
- Biological
- Socio-economic
- Socio-cultural
- Moral and ethical

- Philosophical thinking.

Unit III: Environmental problems

- Local
- Regional
- Global

Unit IV: Environmental challenges

- Sustainability of resources for development
- Efficiency of energy and water resources
- Current and future trends in growth
- Resultant environmental pollution
- Poverty and resource depletion
- Development in industry, agriculture and urbanization

Unit V: Environmental Toxicology

- General effects of pollutants
- Concept of dose and response, dose-response
- Curve, threshold effects, tolerance, acute and chronic effects and risk assessment

Unit VI: Environmental Economics

- Agriculture, aquaculture, the future of agriculture energy sources and
- Consumption, fossil fuels, and the environment, alternative energy sources, solar energy, biofuels
- Geothermal energy and nuclear energy

Unit VII: Ecological Restoration, Landscapes:

- Forests, parks and wilderness, environmental health, pollution:
- Nuclear radiation, thermal pollution, particulates, asbestos, radiation
- Noise pollution eutrophication acid mine
- Drainage, wildlife, fisheries, and endangered species.

Teaching will be done through lecture method with a combination of tasks/projects and presentations.

4. Assessment and Examinations

Assessment will be done as per university/department policy.

5. Textbooks

6. Teaching-learning Strategies

1. Armstrong, F. (2019). *Introduction to Environmental Science* (2nd ed.). Kendall Hunt Pub Co.
2. Botkin, D.B. and Keller, E.A., (2014). *Environmental Science: Earth as a Living Planet*. (9th Ed.). John

7. Suggested Readings

1. Cunningham, W., & Cunningham, M. A. (2010). *Principles of environmental science*. McGraw-Hill Higher Education.
2. McKinney, M.L., Schoch, R.M. and Yonavjak, L. (2017). *Environmental science: systems and solutions*. (6th Ed.). Jones and Bartlett Publishers.
3. Miller, G. T., & Spoolman, S. (2015). *Environmental science*. Cengage Learning. Davis Drive Belmont, CA
4. Wright, R.T. and Nebel, B.J., (2016). *Environmental science: Toward a sustainable future*. (13th Ed.). Pearson Educational.

Course Title: Quantitative Reasoning -I/Logic

Semester: I **Credit Hours: 3**

Course Code: CGQR-101

1. Course Description

Since ancient times, numbers, quantification, and mathematics has played a central role in scientific and technological development. In the 21st century Quantitative Reasoning (QR) skills are essential for life as they help to better understand socio-economic, political, health, education, and many other issues an individual now faces in daily life. The skills acquired by taking this course will help the students to apply QR methods in their daily life and professional activities. This course will also change student's attitude about mathematics. It will not only polish their QR skills, but also enhance their abilities to apply these skills.

2. Course Objectives

After completing this course successfully, students will be able to:

1. create and develop quantitative reasoning skills and apply to daily life challenges involving social and economic issues.
2. apply the learned principles of quantitative reasoning skills in other disciplines.
3. acquire and use the quantitative reasoning skills in different disciplines.
4. make decisions in a logical manner.
5. apply geometrical models to solve real life problems.
6. apply the quantitative reasoning skills in any real-world situation.

3. Course Contents

Unit I: Exploring importance of quantitative reasoning skills

- What is quantitative reasoning?
- Overview of history of mathematics and contributions of Muslim scholars.
- Different types of standard numbers and their role in practical life scenarios

Unit II: Problem solving techniques

- Understanding relationship between parts and whole
- Practical life scenarios involving parts & whole
- Practical life scenarios involving units and rate
- Unit analysis as a problem-solving tool.

Unit III: Numbers & the Universe

- Understanding our World through numbers
- Dealing with very big and small numbers & their applications
- Understanding uncertainty and its applications

Unit IV: Financial Issues

- Stock exchange and economy
- Money management (profit, loss, discount, zakat, simple interest, compound interest and taxation)
- Money management in practical life scenarios like investments and federal budget

Unit V: Exploring expressions

- Practical scenarios involving expressions

- Equating two expressions in one variable & using it to solve practical problems
- Social and economic problems involving expressions

Unit VI: Exploring Beauty in Architecture and Landscape

- Introduce geometrical objects through architecture and landscape
- Dealing with social and economic issues involving geometrical objects

Unit VII: Venn diagrams

- Practical scenarios involving sets and Venn diagrams
- Venn diagrams and their applications in different disciplines.

4. Teaching-learning Strategies

Teaching will be done through lecture method with a combination of tasks/projects and presentations.

5. Assessment and Examination

Assessment will be done as per university/department policy.

6. Textbooks

Bennett, J. & Briggs, W. (2015). *Using and understanding mathematics* (6th Edition). Pearson Education, Limited.

7. Suggested Readings

1. Using and understanding mathematics, 6th edition by Jeffrey Bennet and William Briggs, published by Pearson USA.
2. Mathematical thinking and reasoning 2008 by Aufmann, Lockwood, Nation & Clegg published by Houghton Mifflin Company USA.
3. Precalculus by Robert Blitzer 5th edition published by Pearson USA. Precalculus Graphical, Numerical, Algebraic 8th edition by Franklin D. Demana,
4. Bert K. Waits, Gregory D. Foley & Daniel Kennedy published by Addison Wesley USA.
5. Precalculus Mathematics for Calculus, 6th edition by James Stewart, Lothar Redlin and Saleem Watson published by Brooks/Cole Cengage Learning USA.
6. GRE Math Review https://www.ets.org/s/gre/pdf/gre_math_review.pdf OpenAlgebra.com
7. A free math study guide with notes and YouTube video tutorials.
8. Blitzer, R. (2014). Precalculus. (5th Edition). Pearson Education, Limited. http://xn--webducation-dbb.com/wp-content/uploads/2019/09/Jeffrey-Bennett- William-Briggs-Using-Understanding-Mathematics_-A-Quantitative-Reasoning-

Course Title: Quantitative Reasoning II/ Mathematical Reasoning
Semester: II **Credit Hours: 3**

Course Code: CGQR-102

1. Course Description

This course is based on quantitative reasoning 1 course. It will enhance the quantitative reasoning skills learned in quantitative reasoning 1 course. Students will be introduced to more tools necessary for quantitative reasoning skills to live in the fast paced 21st century. Students will be introduced to importance of mathematical skills in different professional settings, social and natural sciences. These quantitative reasoning skills will help students to better participate in national and international issues like political and health issues. This course will prepare the students to apply quantitative reasoning tools more efficiently in their professional and daily life activities. This course will help them to better understand the information in form of numeric, graphs, tables, and functions.

2. Course Objectives

After studying this course, students will be able to:

1. strengthen their quantitative reasoning skills and apply to daily life problems
2. draw the inferences from the data given in numeric, graphs, tables and functions
3. strengthen their quantitative reasoning skills while making decisions.
4. apply the concepts of functions in social and economic issues and formulate and solve the problems.
5. understand the principal concepts of probability and its applications.
6. demonstrate the application of the learned principles of quantitative reasoning skills in different professional activities, social and natural sciences.

3. Course Contents

Unit I: Exploring graphical information

- Investigating relationships between variables
- Exploring tools to find relationship between variables
- Resources and population growth
- Dealing with Economical, environmental, and social issue

Unit II: Building blocks of a plane

- Graphical and analytical approaches to solve a problem
- Applications of graphical & analytical approaches in social & economic problems

Unit III: Exploring inequalities

- Understanding inequalities around us.
- Dealing with practical problems involving inequalities in different disciplines

Unit IV: Comparing quantities

- Golden ratio in sculptures
- Comparison of statements and their use in social and economic problems
- Number patterns and their application

Unit V: Thinking Logically

- Survival in the modern World
- Propositions and truth values
- Applications of logic

Unit VI: Understanding data

- Exploring and summarizing data, misleading graphs
- Finding a representative value in a data
- Measure and spread of a data, measuring degree of relationship among variables Counting the odds

4. Teaching-learning Strategies

Teaching will be done through lecture method with a combination of tasks/projects and presentations.

5. Assessment and Examinations

Assessment will be done as per university/department policy.

6. Textbooks

1. Using and understanding mathematics, 6th edition by Jeffrey Bennet and William Briggs, published by Pearson USA.
2. Mathematical thinking and reasoning 2008 by Aufmann, Lockwood, Nation & Clegg published by Houghton Mifflin company USA.
3. Pre-calculus by Robert Blitzer 5th edition published by Pearson USA. Pre-calculus Graphical, Numerical, Algebraic 8th edition by Franklin D.
4. Pre-calculus Mathematics for Calculus, 6th edition by James Stewart, Lothar Redlin and Saleem Watson published by Brooks/Cole Cengage Learning USA.
5. https://www.ets.org/s/gre/pdf/gre_math_review.pdf OpenAlgebra.com
6. A free math study guide with notes and YouTube video tutorials.

7. Suggested Sources

• Identifying a linear function:

https://youtu.be/AZroE4fJqtQ

• Functions https://youtu.be/GY6Q2f2kvY0

• Linear functions: https://youtu.be/MXV65i9g1Xg

• Applications of linear equations:

https://youtu.be/UAYCkFMU-YM

• Solving system of linear equations:

https://youtu.be/2DzmE3_QS-E

• Scatter Plot and correlation:

https://youtu.be/qscgK78No70

• Mean Median and Mode:

https://youtu.be/B1HEzNTGeZ4

• Pearson's correlation coefficient

https://youtu.be/jBQz2RGxCek

(Major Courses 1-13)

Course Title: **Philosophy of Education**

Credit Hours: 3
Course Code: MCEd-301
Course Description
This course provides a study of the educational implications of Idealism, Realism, Neo Thomism, Experimentalism and Existentialism. Significant factors will include the curricula emphasis, preferred method, ethics, and aesthetics stressed by each philosophy. Attention is placed on the learner's ability to identify and describe his or her own philosophy of education

OBJECTIVES

The student will be able to:

1 Demonstrate knowledge of several philosophical approaches to the principles of education.
2. Compare several standard philosophical approaches to the problems of education.
3. Inquire philosophically into questions of value, meaning and truth as they relate to education.
4. Discuss and explain the relation of philosophy of education to key educational, societal and Cultural issues.
5. Recognize and properly use common philosophical terms.
6. Articulate a personal philosophy of education for one's own professional practice.

Student Learning Outcomes:

1. Define and discuss representative proponents and thoughts related to Idealism, Realism, Eastern, Pragmatism, Reconstructionism, Behaviorism, Existentialism, Analytic Philosophy, Marxism, and Postmodernism.
2. Discuss the relationship between theory, philosophy and educational practice
3. Describe the historical context of the various philosophies.
4. Compare and contrast the philosophical perspectives of the various philosophers.
5. Discuss each of the philosophies as they relate to the aims of education, teaching methodologies, curricular strategies, and how architectural design is supported by the various philosophies studied.
6. Discuss the strengths and limitations of the various philosophies studied.

Content

1. Education: Definition and Explanation (Differentiate: qualification, education, training).
2. The Origin and Development of Philosophy
3. Meaning and Significance of Philosophy
    3.1 Meaning of Philosophy.
    3.2 Significance of Philosophy
    3.3 Styles of Philosophy: Kneller's classification
        1.3.1 Speculative
        1.3.2 Prescriptive
        1.3.3 Analytic
4. Philosophy and its Neighbors; Religion, Science
5. Understanding important Areas of Philosophy:
    5.1 Ontology
    5.2 Epistemology
    5.3 Axiology
6. Philosophy and Education
    6.1 Definition and explanation
    6.2 Functions of Educational Philosophy
7. Philosophical Foundations of Islamic System of Education
8. Study of Main Schools of General Philosophy
    8.1 Naturalism/ Realism
    8.2 Idealism
    8.3 Pragmatism
    8.4 Existentialism
9. Study of Main Schools of Education Philosophy
    9.1 Perennialism
    9.2 Essentialism
    9.3 Progressivism
    9.4 Reconstructionsim
10. Study of Educational Philosophy of some eminent Muslim Scholars

Some ancient Muslim scholars:

Shah Wali Ullah	Syed Ali Hajveri
Imam Ghazali	Ibne Khuldun
Mujaddid Alif Sani	

Some modern Muslim scholars:

Allama Dr. Muhammad Iqbal	Abul Kalam Azad
Shibli Nomani	Syed Abul A,la Maudoodi
Maulana Muhammad Ali Johar	Naeem Siddiqui
Sir Syed Hussain Qureshi	Dr. Syed Muhammad Abdullah
Dr. Ishtiaq Husain Qureshi	Akber Ilah A' Abadi
A. K. Brohi	Maulvi Abadul Haq
Syed Qutub Shaheed	Imam Hassan Al-Banna Shaheed

Teaching-learning Strategies

Different teaching and learning approaches will be used during the course. They will be focused on developing content knowledge as well as skills and dispositions. Critical reflection and collaboration in learning and teaching as a means of personal and professional growth will be an important consideration throughout the course. Practical strategies to promote personal and professional development will also be introduced.

These include the following:

- Inquiry
- Cooperative learning
- Discussion and debate
- Academic controversy
- Project work
- Field trips.

Assignments

Assignment to be given during first 4 weeks. Contribution to some major debate in the philosophy of technology, requiring outside research. Group Project and Presentation. In groups of 1–4, you will do something to promote socially responsible technology. You will write a 300–500 words summary of your project and give a brief in-class presentation. Your project will be evaluated according to effort (theoretical and practical), effectiveness, and creativity

Assessment and Examinations

Your grade will depend on Class Participation, midterm Exam, In-class, format to be discussed at least a week prior. Final Exam In-class, format to be discussed at least a week prior.

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Textbook:

1. Kneller, G. F. (1964). Introduction to the Philosophy of Education.

Suggested Readings:

1. Samuelson, W. G., & Markowitz, F. A. (1988). An introduction to philosophy in education.
2. Phulsaphy kay Bunyadi Masael by ameen Ahsa Islahi
3. Mughrabi Phulsafa Ka Tanqeedi Mutalya by Pro.Syed Mohammad Saleem
4. Ruwayat e Phulsafa by Ali Abbas jalalpuri
5. Phulsafa e Taleem by Prof.Rab Nawaz Malik
6. Ta'leemat by Munawar Ibn-e-Sadiq

Title of Course: Educational Assessment

Course Code: MCEd-308

Course Description

This is an undergraduate course for prospective teachers. This course, with assessment as to its primary focus, includes understanding the content measured by using data to improve student learning. The course also provides special emphasis related to the nature of assessment and learning in academic settings for technology education. The course deals with the concepts important to the measurement, assessment, and evaluation in technology education. During our discussion of curriculum development

and general methods in technology teaching, we gave the importance of objectives in technology education at all levels.

- **Semester: III**
- **Credit Hours: 3**
- **Pre-requisites course requirements/ skills NA**

Course Objectives

The major focus of this course is to introduce the learners to some important concepts associated with ascertaining whether objectives have been achieved or not. The course takes you through the meanings of the test, measurement assessment, and evaluation in education. Discussion of types of informal and formal assessment; the purpose of assessment; the development and use of valid and reliable assessment instruments, including paper-and-pencil tests and performance assessment focused on practical skills; the selection of tests, administration, scoring, grading, and interpretation of test scores; and the use of assessment information specifically in technology education are the main topics.

Learning Outcomes

After the course the student will be able to:

1. Understand the meaning, trends, and functions of measurement & evaluation in technology teaching.
2. Relate educational objectives with evaluation.
3. Understand the interpretation of test scores.
4. Plan, prepare and administer the teacher-made test.
5. Use appropriate statistical concepts for the analysis of test scores
6. Get acquainted with various examination reforms and alternative assessment strategies.
7. Get develop the ability to apply theoretical knowledge gained through the course.

Contents

Unit-1 Overview of Cognitive, Affective, and Psychomotor Domains

1.1 Psychomotor Domain Taxonomy
1.2 Strategies in Psychomotor Assessment
1.3 Levels of Psychomotor Domain
1.4 Psychomotor test
1.5 Psychomotor in lesson plan
1.6 Rubric for Measuring Psychomotor

Unit-2 The framework for competency-based education and training in Pakistan

2.1 The National Vocational Qualifications Framework
2.2 Competency-based training unpacked

Unit-3 Concept of Measurement and Evaluation in Teaching Technology

3.1 Introduction
3.2 Unit Objectives
3.3 Concept of Measurement and Evaluation
3.4 Different Types of Measuring Scales
3.4.1 Need for Measurement and Evaluation in Education
3.5 Placement, Diagnostic, Formative and Summative Evaluation
3.6 Role of Teachers in an Evaluation Program
3.7 Taxonomy of Educational Objectives
3.7.1 Specification of Objective Steps in Evaluation Process

Unit-4 Assessment in Technical Vocational Education and Training

4.1 Competency-based assessment
4.2 Principles of assessment
4.3 Assessment methods
4.4 Assessment tools
4.5 Plan, conduct and review assessment

Unit-5 Major Tools and Techniques in Educational Evaluation

5.1 Introduction
5.2 Unit Objectives
5.3 Different Types of Tests: Teacher-made vs. Standardized
5.3.1 Criterion-referenced vs. Norm-referenced Tests
5.3.2 Essential Qualities of Good Measuring Instruments
5.4 Education Tests
5.5 Measurement of Achievement
5.5.1 Construction of Achievement Tests and Standardization
5.5.2 Relative Merits and Demerits of Different Test Items
5.6 Diagnostic Test Construction and Usefulness
5.6.1 Types of Diagnostic Tests

UNIT 6 Statistics in Measurement and Evaluation -I

6.1 Introduction
6.2 Unit Objectives
6.3 Statistical Treatment of Data
6.4 Interpretation of Data
6.5 Frequency Distribution and Graphic Representation of Data
6.6 Measures of Central Tendency and Variability
6.7 Co-efficient of Correlation
6.8 Percentile and Percentile Rank

UNIT 7 Statistics in Measurement and Evaluation -II

7.1 Introduction
7.2 Unit Objectives
7.3 Reliability: Concept and Determining Factors
7.3.1 Methods of Determining Different Reliability Coefficient
7.4 Validity: Concept and Uses
7.4.1 Determining Validity Co-efficient
7.4.2 Relation between Validity and Reliability
7.5 Trends in Evaluation: Grading, Credit System, Cumulative Record Card
7.5.1 Issues and Problems
7.6 Computer in Evaluation
7.6.1 Multimedia in Education

Teaching-learning Strategies

Activities in this course may include reading assignments in the textbook, supplemental textbooks, and/or handouts; lectures; group discussions; oral presentations by class members; guest speakers; in class activities, and/or computer-based tutorials. Each student is encouraged to read scheduled topics in

advance of their class. Small and whole class group discussions will be conducted on trends and issues of measurement and evaluation in technology education.
The instructor will use appropriate technology during class lectures and demonstrations (e.g., PowerPoint, spreadsheet, and internet). Students are required to use technology as need for course assignments (e.g., word processing, spreadsheet, and internet).

Assignments

Class participation is required. All students are expected to respond to questions regarding the reading material and contribute to class discussions. The questions will cover material from the readings and class discussions. Test project described separately, presentations, pop-up quizzes, and interpretive exercises will be given. Individually.

Assessment and Examinations

Formative and summative assessment will be done during and at the end of semester through midterm, assignments, presentations, pop-up quizzes and final semester examination.

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Textbooks

- Gronlund, N.E. & Linn, R.L. (1990). Measurement and Evaluation in Teaching (6th ed.). USA: MacMillan Publishing Company.
- Reynolds, C. R., Livingston, R. B. & Willson, V. (2009). Measurement and Assessment in Education (2nd ed.). New York: Pearson.

Suggested Readings

- Bloom, B. S. (Ed.). (1956) Taxonomy of educational objectives, handbook I: Cognitive domain. New York: Longman.

  Haladyna, T. M. (2004). Developing and validating multiple-choice test items. Mahwah, NJ: Erlbaum

Title of Course: Research in Education

Course Code: MCEd-310

Course Description

Study of the research methods and processes applicable to technology education emphasis on defining research problems, collecting, analyzing, recording, and interpreting data. Students will be required to conduct a research project. This course must be taken during the third year in the Technology Education program.

Semester:

Credit Hours: 3

Pre-requisites course requirements/ skills NA

Course Objectives

This subject familiarizes students with a range of skills and methods that are beneficial in carrying out research projects, with an emphasis on student-directed study. Students have the opportunity to study the advantages and limitations of different research approaches, as well as their applicability in different research contexts. They also can gain professional skills and advanced technical skills relevant to their research agenda, and in the critical evaluation of others' research work

Learning Outcomes

After successful completion of this course the students will be able to.

1. Understand research and educational research.
2. Read critically and make sense of (be able to explain) published educational research.
3. Discuss the various types of educational research.
4. Identify problems and issues related to technology education research.
5. Generate research question and hypotheses.
6. Understand the different methods of sampling
7. Develop tools for use in technology education research.
8. Engage with methodological and ethical issues
9. Develop competencies in the use of methods and techniques applied in Technology education research.
10. Write a research proposal on research problems related to technology Education.

Contents

Unit 1 Introduction to Research

1.1 Need for Educational Research
1.2 Source of Knowledge
1.3 The Scientific Approach to Knowledge Generation
1.4 Education Research - Research: Concept, Educational Research
1.5 Concept and Types of Research
1.6 Classification of Research based on Purpose and Classification of Research based on Method
1.7 Steps in Conducting Research

Unit 2 Review of Related Literature

2.1 Concept; Purposes of Review of Related Literature
2.2 Sources of Information – Primary sources, Secondary Sources, Preliminary Sources
2.3 Steps in conducting review of related literature.

Unit 3 Selecting and Defining a Research Problem

3.1 Sources of Problems
3.2 Criteria for selecting a Research Problem
3.3 Evaluating the Problem
3.4 Steps in Defining Research Problem and writing Research Question
3.5 Writing/ Defining a Research Problem
3.6 Stating Null and Research Hypotheses

Unit 4 Researching Technology Education: New ways of Understanding Teaching, Learning and Knowledge.

Unit 5 Classroom Case Studies.

Unit 6 Developing Professional Thinking for Technology Teaching.

Unit 7 The Grid Technique: Making Tacit Knowledge Explicit Assessing Creative Work

and Problem-Solving Skills.

Unit 8 Researching Expertise Development in Complex Computer Application.

Unit 9 A Cultural – Historical Perspective on Research in Design and Technology Education.

Unit 10 Design Performance: Digital Tools: Research Process

Unit 11 Comparative Analysis as a Research Methods in Technology Education.

Unit 12 Observational Techniques for Examining Student Learning Activity in Technology Education.

Unit 13 Capturing Knowledge and Activity.

Teaching-learning Strategies

In Addition to the formal lectures on the topics cited above each student will identify and write a research proposal on the problems related to technology education. Small and whole class group discussions will be conducted on these research problems.

Assignments

Assignment on (Prepare an abstract of the given research paper and write bibliography of the given books, papers etc.) Upload assignment on discussion forum for feedback form peers and instructors. Assignment (design a questionnaire for collecting data from the institutions w.r.t pass percentages in various disciplines and interview schedule for teachers to study how decision are made at department/institute level. Assignment (prepare a research proposal for the identified problem in technical institutions)

4 Assessment and Examinations

Formative and summative assessment will be done during and at the end of semester through midterm, assignments, presentations, pop-up quizzes and final semester examination.

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Textbooks

1. Leedy, P., & Ormrod, J. (2000). *Practical research: Planning and design* (7th ed.). Prentice Hall.
2. Middleton, H. (2008). *Researching technology education: Methods and techniques*. BRILL.

Suggested Readings

Cajas, F. (2000). Research in technology education: What are we researching? A response to Theodore Lewis. *Volume 11 Issue 2 (spring 2000)*. CPSC. (1984). Developing Skills in Technician Education: Research Module 1 to 11, Colombo Plan Staff College for Technician Education, Singapore.

Cresswell, John W. and Gutterman, Timothy C. (2019). Educational Research: Planning, Conducting and Evaluating Quantitative and Qualitative Research. Person Publication.

Cajas, F. (2000). Research in technology education: What are we researching? A response to Theodore Lewis. *Volume 11 Issue 2 (spring 2000)*

Drew, CJ; Hardman, ML and Hosp, JL. (2008). Designing & Conducting Research in Education. Los Angeles: Sage Publications.

Johnson, R.B. and Christensen, L.B. (2008) Educational Research: Quantitative, Qualitative, and Mixed Approaches. 3rd Edition, Los Angeles: Sage Publications, Inc.,

Phillip, C; Tino, S and Mario, S (2016). Experimental Design Research – Approaches, Perspectives, Applications. Switzerland: Springer International Publishing.

(Distribution Courses 1-8)

Course Title: **Designing & Experimental Crafts**

Course Code: DCEd-201

Credit Hours: 4

Course Description

This is an introductory/fundamental course for a technology education program that encourages students to develop their knowledge and skills in a range of arts and experimental crafts, processes, and techniques. Students should demonstrate understanding of conveying visual meaning through graphic design, working to a theme or brief, and considering design constraints and problems. They should also consider traditional, contemporary, and emerging techniques and approaches.

- Semester:
- Credit Hours: 3
- Pre-requisites course requirements/ skills NA

Objectives

On successful completion of this course the students will be able to:

Express his or her own experiences through drawing.
Mix and apply primary colours in his or her creative work.
Experiment with form, colour, and rhythm in decorative edging
Make simple objects and designs in paper and textiles by tearing, cutting, and gluing.
Make simple objects from clay.
Recognize and describe simple artifacts.
Use decorative elements from art and handicrafts in his or her works.

Learning Outcome

Students will learn about traditional and contemporary arts and crafts objects that are both functional and decorative. Students will also be familiar with the uses of different tools and techniques for work processes. And practical creative work.

Course Contents

1. Definitions
    - What is Art?
    - What is Craft?

- What is Design?
- Difference between Art, Craft, and Design

2. Elements of Art/Design
    - Point or Mark
    - Line
    - Shape
    - Forms
    - Space
    - Color
    - Texture
    - Value
3. Principles of Art/Design
    - Balance
    - Proportion
    - Perspective
    - Emphasis
    - Movement
    - Pattern
    - Repetition
    - Rhythm
    - Variety
    - Harmony
    - Unity
4. Color Theory
    - What is Color Theory?
    - Primary Color
    - Secondary Color
    - Intermediate/ Tertiary Color
    - Classification of Color
        i. Hue
        ii. Intensity
        iii. Value (Tint, Tone, And Shade)
5. Color Meaning and Color Wheel
    - Color Meaning
    - Color Wheel
    - Color Schemes
    i. Monochromatic Color Scheme
    ii. Analogous Color Scheme
    iii. Complementary Color Scheme
    iv. Split complementary Color Scheme
    v. Triadic Color Scheme
6. Assignments
    - Primary Color
    - Secondary Color
    - Intermediate /Tertiary Color

- Color Wheel
- Intensity
- Combination of Colors (6 Blocks)
- Greeting Card
- Calligraphy
- Calendar
- Final Project

Teaching-learning Strategies

Besides the formal introductory lectures on the topics mentioned above, each graduate student will complete an assignment related to the graphic representation of mechanical engineering objects.

Assignments

Assignments will be given with a combination of mini-tasks, projects, and presentations related to mechanical engineering.

Assessment and Examinations

Assessment will be done based on assignments, mid-semester, and final semester Tests. Detail is given below.

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is a continuous assessment. It includes classroom participation, attendance, assignments, and presentations, homework, attitude and behavior, hands-on activities, short tests, quizzes, etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on the term paper, research proposal development, fieldwork, and report writing, etc.

Textbook

1. Feisner, E. A. (2006). Colour: How to use color in art and design, Laurence King Publishing.

Recommend Readings

1. Jackson, F. G. , Lessons on Decorative Design, Chapman and Hall, London, 1891.
2. Johnson, R. R. , User-Centered Technology: A Rhetorical Theory for Computers and Other Mundane Artifacts, State University of New York Press, Albany, New York, 1998.
3. Design Principles & Practices, An International Journal, 2011. Available online at http://designprinciplesandpractices.com.

Course Title: Technical and Geometrical Drawing

Course Code: DCEd-202

Course Description

Drawing is something inherent to humanity due to an elemental need to communicate, which is their primary function. The technical drawing is a means of expression and communication, essential for the development of processes of scientific investigation, of technological projects, or of scientific intervention with the aim of creating an industrial or artistic product. Its principal function consists in formalizing or visualizing what is being designed or discovered, providing a first concretion of possible solutions, through to the final stage of development, in which results are presented in definitive plans. It is a compulsory language for all those people who communicate technically at any level and want to convert their work into a creating activity. It contributes effectively to communicating ideas at any stage of their development; in sketch phase, it is an ideal instrument to developing, through the confrontation of opinions, investigation projects or design proposals.

- **Semester: III**
- **Credit Hours: 4**
- **Pre-requisites course requirements/ skills NA**

Course Objectives

1. Develop the capacities which enable them to express with precision and objectivity the graphical solutions.
2. Understand proper use of drawing instruments for preparation of geometric and multi views drawing.
3. Understand the construction of various geometric figures as applicable in Engineering.
4. Apply the techniques of dimensioning and free hand sketching of given objects.

Learning outcomes

Upon successful completion of this course the student will have accomplished the following skills and abilities:

1. Demonstrates an understanding of engineering and engineering graphics department routines and terminologies.
2. Demonstrates proficiency in the use of engineering lettering conventions.
3. Understands the alphabet of lines and demonstrates elementary technical sketching and Shape description.
4. Demonstrates proficiency in the use of engineering scales (measurement).
5. Be familiar with the variety of drawing media.
6. Demonstrates an understanding and practical proficiency in geometric construction.
7. Demonstrates an understanding and practical proficiency in Multi view drawing (Orthographic projection).
8. Demonstrates an understanding and practical proficiency of sectional views.
9. Demonstrates an understanding and practical proficiency of primary auxiliary views.

Course Contents

1. INTRODUCTION

1.1 Historical development of graphic language
1.2 Definitions
Descriptive Geometry
Mechanical Drawing
Engineering Drawing
Technical Drawing
Engineering graphics
Technical sketching
1.3 OBJECTIVES IN DRAFTING
Accuracy
Speed
Legibility
Neatness

2. **INSTRUMENTS**

2.1 Classification of Equipment and their uses
2.2 Scales
2.3 Types of lines, selection of lines and thickness
2.4 Types and selection of Pencil
2.5 Drawing sheet
2.6 Drawing board

3**. LETTERING**

3.1 Lettering
3.2 Importance and types
3.3 Size and style
3.4 Lettering stencils

4. **GEOMETRICAL CONSTRUCTIONS**

4.1 Names of angles
4.2 Triangles, Quadrilaterals and Polygon
4.3 Inscribed and circumscribe figures.
4.4 Terms used in circle.

5. ORTHOGRAPHIC PROJECTION

5.1 Planes-Principal Plane
5.2 Projection and Projection lines
5.3 Dihedral and trihedral angles
5.4 Principal views in 1st and 3rd angles.

6. DIMENSIONING

6.1 Definitions
6.2 Elements in dimensioning
6.3 System of dimensioning

7. PICTORIAL DRAWING

7.1 Definition and uses.
7.2 Brief description of different types of pictorial drawing.
7.3 Isometric axis; angles, scales
7.4 Oblique drawing and their uses
7.5 Perspective drawing-definition and purposes, principles of making perspective views.

8. AUXILIARY VIEWS

8.1 Auxiliary plane-necessity
8.2 Cases of auxiliary views

9. DEVELOPMENT OF SURFACES

9.1 Definition
9.2 Need for Development of Surfaces
9.3 Geometric Solids, Pyramid, Cylinder, and cones.
9.4 True length diagram by right angle triangle and revolution method
9.5 Inter section of solids, prism, and cylinder.

Teaching-learning Strategies

Besides the formal introductory lectures on the topics mentioned above each graduate student will complete different drafting assignment related to graphic representation of objects.

Assignments

Assignments will be given with a combination of mini tasks, projects, and presentations.

Assessment and Examinations

Assessment will be done based on assignments, mid semester and final semester Test. Detail is given below.

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Recommend Readings

1. Giesecke, F. E., Mitchell, A., Spencer, H., Hill, I., Dygdon, J., & Novak, J. . *Technical drawing with engineering graphics*. Prentice HallAitkin, M. J. (1990)., London: Longman.
2. Schraidt, F(1995). Geometrical Drawing. A Collection of Plates for Practical

Title of Course: Manufacturing Technology (Wood and Metal)
Course Code: DCEd-203
Credit Hours: 4
Course Description

This course will provide an opportunity for learners to establish or advance their understanding aims at imparting knowledge and skill components in the field of basic workshop technology. It deals with different hand and machine tools required for manufacturing simple metal and wood components and articles.

Semester:
Credit Hours: 4
Pre-requisites course requirements/ skills NA

Course Objectives

The major aim of this course is to impart knowledge and skill for various workshop techniques by introducing various metals and alloys used in industries for production of various parts. The students to have the hands – on experience regarding welding, proficiency in the use of hand tools and woodwork machines lathe Machine and general tools involved in industrial practices. Such practical working will formulate the professionalism in true spirit and will also develop in students a sense of dignity of labor.

Learning Outcomes

After successful completion of this course the students will be able to.

1. Practice workshop safety rules effectively
2. Operate equipment and tools in metal working and distinguish between their applications
3. Operate equipment and tools in wood working distinguish between their applications
4. Use simple measuring and gauging instruments
5. Operate Lathe machine for wood related components
6. Use the marking out tools very well
7. Operate simple drilling machines for producing small holes
8. Operate various machine tools for producing simple metal components and articles
9. Use foundry, forging and welding machines.
10. Produce simple objects by using the bench and hand tools.

Contents

Unit 1 General safety Considerations

1.1. Bench Tools
1.2. Machinist's Hammers
1.3. Screw Drivers
1.4. Punches
1.5. Chisels
1.6. Scrapers
1.7. Scribers
1.8. Files
1.9. Pliers and Cutters
1.10. Wrenches
1.11. Hacksaw
1.12. Bench Vise
1.13. Hand drill
1.14. Taps and Dies
1.15. Hand Shears
1.16. Rules, Tapes and Squares
1.17. Soldering Iron
1.18. Rivets

Unit 2. Hand Working Operations

2.1. Sawing
2.2. Filing
2.3. Threading
2.4. Scribing
2.5. Shearing

2.6. Soldering
2.7. Riveting

Unit 3. Measuring and gauging

3.1. Introduction
3.2 Semi – Precision Tools – Calipers, depth Gauge, Feeler Gauge
3.3 Precision Tools – Micrometers, Vernier Calipers, Vernier Height Gauge, Telescopic Gauge, Hole Gauge, Bevel Protractor, Dial Indicator, Gauge Blocks and Surface Plate

Unit 4. Drills and Drilling Processes

4.1 Introduction
4.2 Types of Drill Presses
4.3 Work Holding Devices and Accessories
4.4 Cutting Tools
4.5 Geometry of Drill Bits
4.6 Grinding of Drill Bits
4.7 Operations – Drilling, Counter - boring, Counter - sinking, Reaming, Honing, Lapping
4.8 Cutting Speeds
4.9 Drilling Safety

Unit 5. Material Properties

5.1. Tool materials – Low, medium, and high carbon steels; Hot and cold rolled steels; Alloy steels; Carbide and Ceramic materials
5.2. Heat treating methods for steels – Annealing, Tempering, Normalizing, Hardening and Quenching

5.3. Non – ferrous metals – Brass, Bronze, Aluminum – Comparative Properties
5.4 Hard and soft wood

Unit 6. Sheet Metal Works and Carpentry

6.1. Introduction
6.2. Sheet Metal Tools
6.3. Marking and Layout
6.4. Operations – Bending, Cutting, Rolling
6.5 Carpentry

Unit 7 Metal Joining

7.1 Safety Considerations
7.2 Introduction
7.3 Soldering
7.4 Brazing
7.5 Welding – Gas Welding, Arc Welding, Resistance Welding, Tungsten Inert Gas Welding (TIG), Metal Inert Gas Welding (MIG)

Teaching-learning Strategies

Besides the introductory lectures on the topics mentioned above practical will also be conducted to give hands on experience to all students. Participation in workshop activities individually as well as in a group will be observed.

Assignments

All classwork should be done independently, unless explicitly stated otherwise on the assignment handout. • You may discuss general solution strategies but must write up the solutions yourself. • If you discuss any problem with anyone else, you must write their name at the top of your assignment, labeling them "collaborators".

Individual project (Metal) "Square filings of work pieces" and

Individual project (Wood) Construction of T-Lap and Dove tail joint.

5 Assessment and Examinations

Formative and summative assessment will be done during and at the end of semester through midterm, assignments, practical examination, and final semester examination.

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Textbooks

1. Rajender S. (2006). Introduction to Basic Manufacturing Processes and Workshop Technology, 2nd Edition. New Delhi, 2006. ISBN: 978-81-224-2316-7.

Suggested Readings

1. John, K. C. (2010). *Mechanical Workshop Practice*. PHI Learning Pvt. Ltd.
2. Chapman, W. (2019). *Workshop Technology Part 1*. Routledge.
3. Black, B. (2015). *Workshop processes, practices and materials*. Routledge.

Course Title: Computer Aided Technical Sketching & Illustration

Course Code: DCEd-204

Credit Hours: 3

Course Description

The course introduces students to the various fields of computer aided drawing. The course is a next step course in the series of Engineering Drawing. AutoCAD is the world's most widely used and fully featured drafting software. Autodesk software continues to go from strength to strength with the constant addition of new drafting features to aid drawing productivity and streamline drawing workflow. The basic AutoCAD course will give candidates foundation

knowledge in the use of this powerful drafting software that is used across multiple designs, architectural and engineering companies worldwide. Students are introduced to a few basic and fundamental concepts of the computer aided drawings. It gives the insight of AutoCAD software and tools and commands used in it. Student will learn how to create new drawing by using different draw and modify tools. They will also get the skill to draw the dimensions of different objects. By the end student will also have a choice to take up the area of Drafting as specialization if interested in further skill in this field.

- **Type: Major**
- **Credit Hours: 3**
- **Pre-requisites: None**

Objectives

On successful completion of this course the students will be able to:

1. Use of this powerful drafting software that is used across multiple designs, architectural and engineering companies worldwide.
2. To create new drawing by using different draw and modify tools.

Learning Outcome

After completing this course, the student will be able to use powerful drafting software that is used to create across multiple designs, architectural and engineering companies worldwide.

Course Content

Unit 1 - Make the Transition from Paper to CAD

Draw to Scale
Lay Out Your Drawing
Organize Drawing Information
Establish Drafting Standards
Draw Efficiently
Draw Accurately
View Your Drawing
Create Dimensions and Text

Unit 2 - Introduction to AutoCAD and Working with the Windows Environment

Starting AutoCAD and Understanding the Display
Interacting with AutoCAD
AutoCAD File Operations
Use a Mouse
Start a Command
Cancel a Command
Undo/Redo Commands

Unit 3 - Creating Your First Drawing

Setting up a Drawing
Plan and Zoom the Drawing
Setting Units and Scale
Using AutoCAD Drafting Tools
Understanding Objects
Organize Drawing with Layers
Controlling Layer States

Unit 4 - Basic CAD Drawing Techniques

Setting the Display Format and Units
Set Grid and Snap Values
Grid Snap and Object Snap Settings
Coordinate System Basics
Draw Lines
Draw with Coordinates
Specifying Angles and Distances

Unit 5 - Understanding Layers and Line types

Working with Layers
Understanding and Creating Line types

Unit 6 - Creating Basic Geometry

Drawing Rectangles
Drawing Circles
Drawing Polygons
Drawing Arcs

Unit 7 - Annotating a Drawing with Text and Hatching

Adding Text to a Drawing
Filling Areas with Hatchin

Unit 9 - Basic Editing Skills

Deleting and Restoring Objects
Moving, Copying, and Offsetting Objects
Producing Arrays of Objects (ARRAY)
Rotating, Mirroring, Scaling, and Stretching Objects
Trimming the Objects (Boundary and Cutting Edges)
Editing Edges and Corners of Objects
Chamfers and Fillets

Unit 10 - Advanced Drawing Techniques

Dividing and Measuring an Object
Drawing Rings and Ellipses
Working with Multiline

Unit 11 - Dimensioning a Drawing

Dimensioning Basics and Dimensioning with Precision
Linear and Radial Dimensioning
Angular Dimensioning
Editing Dimensions

Assignments

Assignments will be given with a combination of individual/group projects, and presentations.

Assessment and Examinations

Formative and summative assessment will be done during and at the end of semester through midterm, assignments, presentations, pop-up quizzes and final semester examination.

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a

Recommended Readings:

1. AutoCAD 2009 2D Training Mannual by: Kristen S. Kurland
2. AutoCAD Lynn Allen's Tips and Tricks for Using AutoCAD 2009
3.

Title of Course: **Basic Electricity**

Course Code: DCEd-205

Course Description:

Understanding electricity involves sound familiarity with the established laws and Concepts and their application in different situations. Thus, solving problems also forms Part of the cognition of these concepts. This course aims at providing a strong foundation in these basic concepts and laws of electricity, along with an appreciation of the magnitudes of the quantities involved or to be guessed, through solving numerical problems. The concepts are further strengthened through extensive Laboratory work.

- Semester:
- Credit Hours: 4
- Pre-requisites course requirements/ skills NA

Course Objectives

The course objectives are:

1. Impart a basic knowledge of electrical quantities such as current, voltage, power, energy, and

frequency to understand the impact of technology in a global and societal context.

1. Provide working knowledge for the analysis of basic DC and AC circuits used in electrical and electronic devices.

2. To explain the working principle, construction, applications of DC machines, AC machines &

measuring instruments.

3. Highlight the importance of transformers in the transmission and distribution of electric power.

Learning Outcome

On completion of the course, students will be able to

1. Predict the behavior of any electrical and magnetic circuits.

2. Formulate and solve complex AC, Dc circuits.

3. Identify the type of electrical machine used for that application.

4. Realize the requirement of transformers in the transmission and distribution of electric power and other applications.

5. Function on multi-disciplinary teams

COURSE CONTENTS

UNIT-I D.C. FUNDAMENTAL

ELECTRIC CURRENT AND OHM'S LAW

1. UNDERSTAND BASIC CONCEPTS OF ELECTRICITY

1.1 Electricity history.

1.2 Compare conductor, Insulator & semi-conductor.

1.3 Define Resistance, conductance, and state units.

1.4 Define electrical current and state it's unit.

1.5 Define potential difference and state its unit.

1.6 State Ohm`s law.

1.7 Define series and parallel circuits with their properties.

1.8 Determine total resistances in series & parallel circuits.

1.9 Calculate division of voltage in series circuits.

1.10 Calculate division of current in parallel circuits.

2. UNDERSTAND KIRCHHOFF'S LAWS

2.1 State Kirchhoff`s 1st Law - (current Law).

2.2 State Kirchhoff`s 2nd Law - (voltage Law).

3. UNDERSTAND WORK, POWER & ENERGY

3.1 Define work, electrical power, mechanical power, and energy with their units.

3.2 State formula for conversion of Electrical Energy to Mechanical Energy.

4. UNDERSTAND MAGNETIC EFFECTS OF ELECTRIC CURRENT

4.1 Explain Laws of Magnetic force.

4.2 Describe the Magnetic field of a straight current-carrying conductor.

4.3 Determine the Magnetic field of a coil.

4.4 State cork-screw rule.

4.5 Describe the effect of the iron core in a coil.

5. UNDERSTAND ELECTROMAGNETIC INDUCTION

5.1 State Faraday's Laws of Electromagnetic Induction.

5.2 Define dynamically & statically induced E.M.F

5.3 Explain Lenz's Law

5.4 Explain self & Mutual Inductances.

6. UNDERSTAND FUNDAMENTALS OF ELECTROSTATICS

6.1 Define the term static-electricity.

6.2 Explain the term capacitance.

6.3 List types of capacitors.

6.4 Explain charging & discharging of capacitors.

UNIT-II A.C. FUNDAMENTALS.

7. UNDERSTAND A.C. FUNDAMENTALS

7.1 Define alternating current & voltage.

7.2 Describe the principle of working of A.C. Generator.

7.3 Explain simple loop Alternator & relationship between speed, poles, and frequency.

8 UNDERSTAND CONSTRUCTION & PRINCIPLE OF TRANSFORMER.

8.1 Define transformer as a step up and step down.

8.2 Describe parts of the transformer.

8.3 Explain the principle of transformer.

8.4 a) Describe the classification of the transformer.

b) Differentiate core type & shell type transformer.

9 WORKING OF 1 PHASE INDUCTION MOTOR.

9.1 State the types of 1 phase Induction motor

9.2 Explain the principle of working of split-phase, capacitor & shaded pole motor

9.3 Explain the principle of repulsion motor, A.C series motor, and universal motor.

10 UNDERSTAND PRINCIPLES, TYPES, AND USES OF DIGITAL METERS

10.1 Explain working principle (Block diagram)

10.2 Explain types in lab use (Voltmeter, Ammeter, and Ohmmeter, AVO meter, watt meter (single-phase & three-phase), Energy meter (single phase & three phases), and frequency meter).

11 UNDERSTAND WORKING PRINCIPLE OF OSCILLOSCOPE

11.1 Explain the working of the Oscilloscope tube

11.2 Enlist parts of Oscilloscope

11.3 Explain applications for finding wave shape and frequency.

LIST OF PRACTICALS

Note: Students should demonstrate concern for personal and equipment safe while working in Electrical Labs

1. Study of simple Electrical Instruments (Ammeter, Voltmeter, etc.
2. Determination of the resistances of
   a) Sliding Rheostat.
   b) Voltmeter.
   c) Incandescent lamp.
3. Determination of resistance of a wire by a micrometer.
4. Determination of temperature co-efficient of copper by ammeter-voltmeter methods.
5. Verification of ohm's law.
6. Verification of laws of combination of resistances.
7. Study of various types of resistors and determination of resistance by color-coding.
8. Measurement of power by Voltmeter-ammeter method and wattmeter.
9. Study of connections of a thermal relay.
10. Measurement of the energy-by-energy meter.
11. Verification of Kirchhoff's Laws.
12. Determination of the efficiency of an Electric Kettle.
13. Make an electromagnet.
14. Study of the force on a current-carrying conductor in a magnetic field.
15. Verification of Faraday's laws of electromagnet induction.
16. Study of Generator and Transformer.
17. Study the production of e.m.f in coupled coils by changing current in one coil.
18. Problem-solving session.
19. Study of self-induction of a coil and effect of introducing iron core in it.
20. Study of various types of capacitors and Inductors.
21. Determination of the capacity of capacitors by color-coding.

22. Verification of the laws of the combination of capacitors.

23. Determination of breakdown voltage of a low-voltage capacitor.

24. Test week: Every student should be given independent different practicals and the teacher should count its performance towards sessional marks.

each student must conduct one practical evaluation for the final test.

** Students must prepare theory and practical notebooks and get them checked weekly

by the concerned teacher. He should produce it to the external examiner for sessional

work/marking check-up at the time of the final exam.

Assessment and Examinations
Assessment will be done as per university/department policy.

Sr. No.	Elements	Weightage	Details
4.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
5.	Formative Assessment	25%	It is a continuous assessment. It includes classroom participation, attendance, assignments, and presentations, homework, attitude and behavior, hands-on activities, short tests, quizzes, etc.
6.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on a term paper, research proposal development, fieldwork and report writing, etc.

Books Recommended:

1. Gelder, K. (Ed.). (2000). *The horror reader*. Psychology Press.
2. Dawes, C. L. (1934). Encouraging initiative in the engineering student. *Electrical Engineering*, *53*(10), 1416-1418.
3. Tu, H., Yang, Y., Zhang, L., Xie, D., Lyu, X., Song, L., ... & Sun, J. (2018). A modified admiralty coefficient for estimating power curves in EEDI calculations. *Ocean Engineering*, *150*, 309-317..
4. Theraja, B. L., & Theraja, A. K. (2006). Electrical Technology S. *Chand & company Ltd Ram Nagar, New Delhi 24th Edition Pp2416-2421*..
5. Kuznetsov, M., Vershinin, O., Tyrtyshnyy, V., & Antipov, O. (2014). Low-threshold mode instability in Yb 3+-doped few-mode fiber amplifiers. *Optics express*, *22*(24), 29714-29725.

Title of Course: **GENERAL ELECTRONICS**

Course Code: DCEd-206

- Credit Hours: 4
- Pre-requisites course requirements/ skills NA

Course Discerption:

This course is designed to enable the students to understand the basic principles of semiconductor electronics devices. It also provides basic insight in the working and applications of power electronic devices in control Circuits. The course also includes simple problem solving.

Learning Objectives:

It is envisioned that all institutions will make efforts to follow the Outcome Based Education (OBE) system and focus on the learning and growth of the students. The curriculum is designed to enable the students to learn, understand, and apply the fundamental and advanced concepts of electronics. This curriculum should be taught in such a manner that it produces scientists with sufficient hands-on skills and problem-solving mindset, to contribute effectively to the profession. To derive the maximum benefits from this curriculum, the students should be provided ample opportunities to polish their communication skills, exhibit ethical behavior and effective leadership, and prepare themselves to be a responsible professional of the society.

Learning outcomes

After studying this course, you should be able to:

1. recognize a variety of exciting high-tech products and systems enabled by electronics
2. manipulate voltages, currents, and resistances in electronic circuits
3. demonstrate familiarity with basic electronic components and use them to design simple electronic circuits
4. see how signals can be represented in the time and frequency domains for Fourier analysis
5. Record, analyses, and filters audio signals to improve their fidelity.

Unit-I

1 UNDERSTAND TYPES OF BASIC SEMI-CONDUCTOR

1.1 Explain the terms-semi-conductor, intrinsic and extrinsic.

1.2 Explain P and N type doping

1.3 State majority and minority charge carriers in P & N type semi-conductors

2 UNDERSTAND THE CONSTRUCTION AND APPLICATIONS OF PN DIODES AS RECTIFIER

2.1 Explain formation of PN-junction.

2.2 Define potential barrier of PN junction.

2.3 Compare forward bias and reverse bias.

2.4 Discuss static volt ampere characteristics of diode (forward and reverse bias).

2.5 State applications of diode.

2.6 Draw and discuss half wave rectification circuit (with wave forms).

2.7 Draw and discuss full wave rectification circuit (with waveforms) by using:

a. Centre tapped transformer.

b. Bridge rectifier.

2.8 Explain the need of filters in DC power supply

2.9 Draw circuit diagram of filtering network (T & Pi).

2.10 Define term ripple factor.

2.11 Describe use of diode as a switch.

3 UNDERSTAND WORKING AND USES OF ZENER AND PHOTO DIODES

3.1 Explain the working and construction of Zener diode

3.2 Explain the behavior of Zener diode in Breakdown region.

3.3 give ratings of Zener diode.

3.4 Explain the Zener diode in power supplies and voltage regulation circuits.

3.5 Describe construction & working of photo diode.

3.6 Draw photodiode control circuit.

4 UNDERSTANDING CONSTRUCTION, WORKING AND USES OF BIPOLAR JUNCTION

TRANSISTOR (BJT)

4.1 Explain construction of transistors.

4.2 Constructional details of PNP and NPN transistor.

4.3 Draw PNP and NPN transistor circuits with proper biasing.

4.4 Describe principle of working of transistor as amplifier.

4.5 Describe current gain, voltage gain & power gain of a CE amplifier.

4.6 List uses of transistors.

a. As a switch.

b. As voltage & current amplifier.

5 UNDERSTAND THE WORKING AND USES OF FIELD EFFECT TRANSISTORS

5.1 Explain the construction & working of JFET.

5.2 List types of FET and their uses.

5.3 Describe use of JFET as an amplifier.

5.4 Explain construction of MOSFET.

5.5 Draw symbols of IGFET and MOSFETS

5.6 State special handling procedures of MOSFETS

6 UNDERSTAND THE TYPES, WORKING AND USES OF THYRISTORS SPECIALLY SILICON

CONTROLLED RECTIFIER, DIAC, TRIAC

6.1 Define a thyristor.

6.2 Explain construction and working operation of SCR's.

6.3 Draw equivalent model of SCR by two transistors analogy.

6.4 Explain phase control of SCR.

6.5 Explain use of SCR's as AC & DC Power control circuits with the help of circuit diagrams.

6.6 Explain the operation of Diac.

6.7 Draw characteristics & waveforms of Diac.

6.8 Explain the construction and working of TRAIAC

6.9 Enlist applications of Diac & Triac.

7 UNDERSTAND WORKING AND USES OF SPECIAL SOLID-STATE DEVICES SUCH AS UNIJUNCTION TRANSISTOR (UJT), PHOTO TRANSISTOR, LIGHT ACTIVATED SILICON

CONTROLLED RECTIFIER (LASCR), OPTO COUPLER

7.1 Explain the construction and working of UJT.

7.2 State the equation for Peak Firing Voltage

7.3 Draw characteristic curve of UJT

7.4 Enlist common applications of UJT

7.5 Explain Saw-tooth oscillator using UJT, with the help of circuit diagram

7.6 Explain the working of photo transistor.

8 UNDERSTAND THE WORKING OF LOGIC GATES, USING TRUTH TABLES

8.1 Define the logic gates NOT, OR, AND, NAND, NOR XOR, XNOR.

8.2 Draw truth tables for the logic gates, showing symbols and equations.

8.3 Explain logic gates, using TTL circuitry.

Unit II

LIST OF PRACTICALS

1. To construct a half wave rectifier circuit and to check its output on oscilloscope.

2. To construct a full wave rectifier circuit and measure the input & outputs wave forms.

3. Demonstrate the effects of filter capacitance on DC output voltage and ripple.

4. Measure and plot the line voltage regulation properties of a typical shunt-type Zener diode voltage regulator.

5. Assemble an alarm circuit using a photo conductive cell (Project).

6. Assemble a Regulated Power Supply Circuit (Project)

7. Identify base - emitter and collector terminals and connections of NPN and PNP transistors.

* Students should prepare the projects mentioned above and retain them for final evaluation.

** Students should also prepare practical notebooks and get it checked weekly by the concerned teacher. They should also produce it to external examiner for sessional work/marking check up at the time of final exam.

Note: The Projects shown are only a reference to their level of complexity. The teachers may select other projects involving solid state devices and/or IC's.

Assessment and Examinations

Textbooks:

1. Grob, B. (1977). Basic Blectronlcs.

Sr. No.	Elements	Weightage	Details
4.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
5.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
6.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

2. Bogart, T. F. (2004). *Electronic devices and circuits*. Pearson Education India.

Suggested Readings:

3. Experiments in Electronic Devices by Berlin (2nd Edition).

4. Duncan, T., Murray, J., & Emery, C. (1985). Electronics for today and tomorrow.

5. Tocci, R. J. (1991). *Digital systems: principles and applications*. Pearson Education India.

6. Qasem, A., Hassaan, M. Y., Moustafa, M. G., Hammam, M. A., Zahran, H. Y., Yahia, I. S., & Shaaban, E. R. (2020). Optical and electronic properties for As-60 at. % S uniform thickness of thin films: Influence of Se content. *Optical Materials*, *109*, 110257

Title of Course: INDUSTRIAL MANAGEMENT

Course Code: DCEd-207

Course Description:

Due to study of this subject, the students will be able to develop the management skill and understanding the basic principles of management and human relation and develop psychological approach to solve the labor. Problems.

- Semester:
- Credit Hours: 4
- Pre-requisites course requirements/ skills NA

Course Objectives

The course is designed to assist non-specialist students to acquire understanding of business organizations and management processes, and their relevance in complementing technical skills.

Learning Outcome

Upon completing the course, the student should be able to

1. choose, prepare, interpret, and use cost estimates as a basis for the different situations in an industrial company,
2. interpret financial statements and other financial reports of industrial companies, including the income statement, the balance sheet, the cash flow statement, and key measures in these,
3. explain how strategic planning, management, management control, entrepreneurship, organization, production, and learning works in an industrial company,
4. explain how the industrial company markets and price it's products,
5. Explain how the company deal with its environment.

COURSE CONTENTS

UNIT-I

1. KNOW INDUSTRIAL PSYCHOLOGY.
1.1 Describe brief history if industrial psychology.
1.2 Describe in detail definition of industrial psychology.
1.3 State nature and scope of industrial psychology.
1.4 Elaborate the management skills.
2. LEADERSHIP.
2.1 Define leadership.
2.2 Describe types of leadership.
2.3 State qualities of a good leader.
3. MOTIVATION.
3.1 Define motivation.
3.2 Describe financial and non-financial motives.
3.3 Explain conflict of motives.
4. MORALE.
4.1 State importance of morale.
4.2 Describe development of morale.
4.3 State the method of measurement of morale.
5. HUMAN ENGINEERING.
5.1 Explain importance of human engineering in the industry.
5.2 Explain man-machine system.
5.3 Explain strategy for making allocation decisions.
6. INDUSTRIAL FATIGUE AND BOREDOM.
6.1 Define fatigue and boredom.
6.2 Describe psychological causes of fatigue and boredom.
6.3 Describe objective causes of fatigue and boredom.
6.4 Explain measures to prevent fatigue and boredom.
7. INDUSTRIAL ACCIDENTS.
7.1 Explain psychological causes of industrial accidents.
7.2 Explain objective causes of industrial accidents.
7.3 Explain measures to prevent industrial accidents.
8. AND INDUSTRIAL PREJUDICE.

8.1 Define prejudice
8.2 Explain causes of industrial prejudice.
8.3 Explain remedies of industrial prejudice.

9. PUBLIC RELATIONS.

9.1 Explain importance of public relations.
9.2 Explain functions of public relations.

10. GUIDANCE AND COUNSELLING.

10.1 State importance of guidance and counseling.
10.2 Explain the role of guidance and counseling in choosing the job.
10.3 Describe help of guidance and counseling during service.

11. JOB EVALUATION.

11.1 Explain importance of job evaluation.
11.2 Explain methods of job evaluation.
11.3 Explain job satisfaction.
11.4 Explain work simplification.

12. INDUSTRIAL MANAGEMENT.

12.1 Define management.
12.2 State functions of management.
12.3 Enlist subdivision of management.
12.4 Explain objectives of industrial management.

13. TRAINING AND ITS EFFECTS.

13.1 Describe the recruitment procedure of employees in an industrial concern.
13.2 Explain training.
13.3 Identify the kinds of training.
13.4 Explain the effects of training on production and product cost.

14. WORKING CONDITION ON EFFICIENCY.

15.1 Explain importance of working condition.
15.2 Describe air-conditioning, ventilation, lighting and noise.
15.3 State the effects of good working conditions on efficiency and per unit cost.

15. TIME AND MOTION STUDY.

15.1 Explain the concept.
15.2 Describe the importance of work study.
15.3 Explain the sequence of motion study.
15.4 State the principles of motion study.
15.5 Describe the steps for carrying out time study.
15.6 Explain the method of determination of operations time.

16. QUALITY CONTROL.

16.1 Define quality control
16.2 State the advantages of quality control.
16.2 Explain methods of quality control.

17. UNDERSTAND THE ROLE OF FOREMAN IN AN INDUSTRIAL UNDERTAKING.

17.1 Explain ability of the foreman.
17.2 Enlist duties of foreman.
17.3 Describe functions of foreman as middle management.

Assessment and Examinations

Assignments will be given with a combination of mini tasks, individual and group projects.

Sr. No.	Elements	Weightage	Details

1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Books Recommended:

1 C.S. Meyers, Industrial Psychology, Oxford University Press, London.
2. Smith Wakley, Psychology of Industrial Behaviors, Mc-Graw Hill, New York.
3. Ghulam Hussain, Nizamat-e-Sanaat Aur Insani Rawabat, Ilmi Kitab Khana, Urdu Bazar, Lahore.
4. Andrew R. Megill, The Process of Management William M New Man.
5. Richard N Omen, Management of Industrial Enterprises.

Title of Course: **Glass, Ceramic and Pottery**

Course Code: DCEd-208

Credit Hours: 4

Course Description

This course is required to introduce the students with the materials used in ceramic engineering i.e., glass, enamel, pottery, refractory & cement. The only elementary knowledge of the raw materials used in different fields of ceramic industry and their applications is kept in the subject. The creation of new processing approaches suggests which properties of materials we can take advantage of in a certain time and place.

- Semester: VI
- Credit Hours: 3
- Pre-requisites course requirements/ skills NA

Course Objectives

The course embraces diverse approaches to craft, supporting learners to explore all methods of ceramics and glasswork, including traditional and contemporary practices. The course mostly focuses on practical-oriented skill aided by some theory as it is necessary for understanding the procedures and processes of performing different tasks and functions. Further, this course is developed by considering the requirements of local market and need of the market-jobs with a view to reduce the shortage manpower in this area

Learning Outcomes

Upon completion of this course students will be able to:

- Explain the basic ceramic-terms and its classifications.
- Identify the properties of ceramics.
- Describe the ceramics raw materials, their usage & properties.
- Express the material mixing methods
- Describe the work of materials processing.
- Describe the classification of clay bodies and their properties.

- Describe the knowledge of different forming techniques used in ceramics industry
- Weighing of raw materials, mixing, forming, and finishing drying, glazing, and firing in a Ceramics Process Industry.

Contents

Unit-I Glass

1.1 Elementary knowledge of raw materials
1.2 Types of glass
1.3 Container
1.4 Glass sheet and plate glass
1.5 Laboratory wares
1.6 Decoration of Glass

Unit-II Ceramics

2.1 Elementary knowledge of ceramics
2.2 Classification of ceramics
2.3 Ceramics their properties and uses
2.4 Ceramics techniques.

Unit-III Pottery

3.1 Introduction to Pottery
3.2 Types of pottery wares
3.3 Porcelain
3.4 Stone wares
3.5 Terracotta sanitary wares
3.6 White wares

Unit-IV Refractory

4.1 Basic knowledge of materials considered as refractories.
4.2 Types of refractories.
4.3 Basic refractory.
4.4 Neutral refractory.

Unit-V Cements

5.1 Elementary knowledge of cements.
5.2 Raw materials used in the manufacturing of cement,
5.3 Applications of cements.

Teaching-learning Strategies

Weekly sessions will be divided between lectures and seminars. Lectures will offer an overview of the key theories and concepts, alongside with a critical perspective. Seminars will be the occasion for students to engage in developing their own project. Students are expected to read the corresponding chapters in the course textbook before each session. Portal will be used to upload lecture notes and other essential course-related information.

Assignments

Assignments will be given with a combination of mini tasks, individual and group projects.

Assessment and Examinations

The assessment is composed of a written assignment and two hours written and practical examination. The assignment will be used to test awareness of a specific business problem related to entrepreneurial theory and practice and allow the students to show innovation and creativity in the development of their own solutions to strategic business problems and planning. The examination will be used to test subject-specific knowledge and understanding and transferable skills such as time management and presentational and communication skills.

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test,

Textbooks

- Kingery, W. D., Bowen, H. K., & Uhlmann, D. R. (1976). *Introduction to ceramics* (Vol. 17). John wiley & sons.

Suggested Readings

HenrikNorsker, The Self-Reliant Potter: Refractories and Kilns, Dt. Zentrumfnr EntwicklungstechnologienÃ¹GATE, 1987 , ISBN 3-528-02031-8.

LoretteEspi,Step by Step Pottery & Ceramics, Crescent Books, New York.

Susan Peterson, The Craft and Art of Clay, Overlook Press, 1996.

DaraBillington, The technique of Pottery, BT Batsford Ltd, London.

O.P.Gupta: Elements of Fuels, Furnaces and Refractories, Khanna Publishers. Ghulam RasoolChaudhry, Ceramic kiln, Punjab Small Industry Co.

F. H. Norton (1949) Refractories. New York: McGraw-Hill.

Kaplan, J., & Zamek, J. (2011). A substitute for gerstley borate. *Ceramics Technical*, (32), 24-29

Title of Course: **Entrepreneurship in Technology Education**

Course Code: DCEd-209

Course Description

This course is designed to provide students with an understanding of enterprise at the individual, firm, and societal level of inquiry. The course will enable students to understand theories of entrepreneurial behavior, innovation and wider societal issues and enable them to relate such theories to practice. They will also simulate an understanding of the behaviors of an entrepreneur placed within the dynamic of business. The purpose is to enable students to be aware of the importance of enterprise in the economy.

- Semester:
- Credit Hours: 3
- Pre-requisites course requirements/ skills NA

Course Objectives

The aims of this course are to develop an understanding of the psychological, sociological, and economic theories of enterprise and entrepreneurship and to enable students to understand how to relate these ideas to practice.

Learning Outcomes

Upon completion of this course students will be able to:

- Understand entrepreneurship in relation to large and small business.
- Understand the role of entrepreneurship in the economy and society.
- Understand the nature and characteristics of the entrepreneurship theory and Practice.
- Understand the fundamental principles of entrepreneurial practice.
- Identify and describe key elements of the entrepreneurship in relation to small and
- Large business organizations.
- Identify and describe the main components of entrepreneurship in business organizations and their immediate operational environment.
- Identify the key actors and agents within the entrepreneurial skills.
- Describe entrepreneurial characteristics and behaviors and entrepreneurial strategy.

Contents

Unit-I Introduction

1.7 Introduction to the field of entrepreneurship.
1.8 What is entrepreneurship
1.9 Nature and importance of entrepreneurship.

Unit-II Entrepreneurial Activities and Innovation

2.1 Creativity and innovation.
2.2 Local environment and innovation: entrepreneurial milieus and ecosystems.

Unit-III The Business Plan and the Business Model

3.1 Characteristics of a business plan: How to prepare a business plan?
3.2 From business plan to strategic plan to business model.
3.3 The business model wheel.

Unit-IV Nature and purpose of entrepreneurship and enterprise.

4.1 Common and essential attributes of entrepreneurs.

4.2 Motives for creating and developing new business venture.
4.3 Factors that determine business success.
4.4 Development approaches needed in a business environment.

Unit-V Identification of objectives and strategic planning.

5.1 Entrepreneurship and Uncertainty.
5.2 Entrepreneurship and Innovation.
5.3 Start-up and development of a new business: relevance of the public private and voluntary sectors.
5.4 Case-Studies: Selected examples of creativity in the marketplace - evaluation of its role in determining successful entrepreneurship

Teaching-learning Strategies

Weekly sessions will be divided between lectures and seminars. Lectures will offer an overview of the key theories and concepts, alongside with a critical perspective. Seminars will be the occasion for students to engage in developing their own project. Students are expected to read the corresponding chapters in the course textbook before each session. Portal will be used to upload lecture notes and other essential course-related information.

Assignments

Assignments will be given with a combination of mini tasks, individual and group projects.

Assessment and Examinations

The assessment is composed of a written assignment and two hours written examination. The assignment will be used to test awareness of a specific business problem related to entrepreneurial theory and practice and allow the students to show innovation and creativity in the development of their own solutions to strategic business problems and planning. The examination will be used to test subject-specific knowledge and understanding and transferable skills such as time management and presentational and communication skills.

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Textbooks

1. Deakins, D & Freel, M (2006), Entrepreneurship and Small Firms, London: McGraw Hill. Dhaliwal, S (2008), Making a Fortune - Learning from the Asian Phenomenon, London: Capstone.
2. Kirby, D (2003), Entrepreneurship, Maidenhead: McGraw Hill. Londstroom,
3. A & Stevenson, L (2005), Entrepreneurship policy: Theory and practice, London: Springer.

Suggested Readings

1. Barrow, C, Barrow, P & Brown, R (2012), The Business Plan Workbook, (7th Edition), London: Kogan Page.
2. Bragg, A & Bragg, M (2005), Developing New Business Ideas: A step-by-step guide to creating new business ideas worth backing Harlow: Prentice Hall.
3. Bridge, S, O'Neill, K & Cromie, S (2003) Understanding Enterprise, Entrepreneurship and Small Business, Hampshire: Palgrave MacMillan.
4. Burns, P (2007), Entrepreneurship and Small Business, Hampshire: Palgrave Macmillan.
5. Carter, S & Jones-Evans, D (2006), Enterprise and Small Business, London: Prentice Hall.
6. Deakins, D & Freel, M (2006), Entrepreneurship and Small Firms, Maidenhead: McGraw Hill.
7. Drucker, P (1997), Innovation and Entrepreneurship, Oxford: Butterworth-Heinemann. Gibson, D (2006), The E-factor: Entrepreneurial competencies for personal and business success, Harlow: Pearson.
8. Gill, J (2005), Business Law for the Entrepreneur, Bury St. Edmunds: Ask House.
9. Hisrich, R, Peters, M & Shepherd, D (2008), Entrepreneurship, Maidenhead: McGraw

Course Title: **Introduction to Information Technology**

Course Code: DCEd-210

Course Description

Introduction to Information Technology is a broad and constantly changing subject. This course will prepare teachers to understand, use and apply a range of technologies* and platforms in teaching and learning, in line with international standards. With the changing face of technologies and related applications, this course will primarily focus on using technologies for learning 'how to learn' to cope with change. It will provide opportunities to prospective teachers to collaborate with students, educators, peers, parents, and the global community using digital tools and resources to support learning, success, and innovation.

- **Semester:**
- **Credit Hours: 3**
- **Pre-requisites course requirements/ skills NA**

Course Objectives

The course is aimed at specifically developing the following competencies in prospective teachers:

1. critical thinking and reflective approach,
2. decision-making,
3. handling of dynamic situations,
4. multi-tasking
5. working as a member of a team, and collaboratively
6. communicating effectively, and
7. General ICT competencies enabling professional and day-to-day work.

Learning Outcome

After completing this course, prospective teachers will be able to:

1. To develop a well-articulated perspective on information and communications technology in education informed by personal experience and critical examination of computer resources, curriculum, and educational practice.

2. model and facilitate effective use of current and emerging digital tools to locate, analyze, evaluate, and use information resources to support research and learning.

3. Engage students in exploring real-world issues and solving authentic problems using digital tools and resources.

4. Participate in local and global learning communities to explore creative applications of technology to improve student learning.

5. Promote student reflection using collaborative tools to reveal and clarify students' understanding and thinking, planning, and creative processes.

6. Evaluate and reflect on current research and professional practice regularly to make effective use of existing and emerging digital tools and resources in support of student learning.

7. Develop confidence, skill, and an attitude to use a range of technologies (radio, video, computer, digital and online tools, digital accessories, etc.) for instruction and generating new knowledge for life-long learning.

Learning Outcomes:

Course Content Unit-1:

Introduction to IT Policy, and Other Guidelines for Use of IT in Education

Introduction and Guidelines

a. Introduction to the course – IT in Education
b. Pre-assessment for the course
c. 21st Century Skills – the need of the day
d. What is IT?
e. Highlights - National ICTs Strategy for Education in Pakistan, National Education Policy 2009

ICTs Integration, Standards and Competencies for Teachers

a. ICTs Integration – Why and What it means; objectives; misconceptions
b. ICT competencies for Teachers

c. Highlights - National Professional Standards (NTSTP) for ICTs in Education
d. Introduction to electronic Portfolios – setting up for the course

Unit 2:

ICTs Integrated into Curriculum and Instruction

Learning through custom-designed/ready-made applications (available on DVDs/CDs – Story of Pakistan, tutorials, multimedia encyclopedias, etc.)

Exploring the custom-designed multimedia resources
Instruction using available applications for teaching of Pakistan Studies/History, Functional English, Methods of Teaching, etc.)
Lesson planning and review

Audio, Radio Broadcast, and Interactive Radio Instruction (IRI)

Power of audio/radio in education
Using audio/radio/IRI resources for the teaching of different subjects (Functional English, Pakistan Studies/Islamic Studies, Early Childhood Education, etc.)
Case studies for extended reading

Video, animations, movies, and television broadcast

(Examples for different content/subject and pedagogy areas - Child Development, Early Childhood Education, Communication, Geography, Science, etc.)

Using recorded-classroom videos (Examples for different subject and pedagogy areas - Child Development, Early Childhood Education, etc.)
Using video prompts in the classroom
Lesson Planning using video resources

Learning through Internet (applications, etc.)

(Examples for different content/subject and pedagogy areas – Teaching of Science, language development, improving communication skills, etc.)

a. Concept of globalization – 'Global Teacher Community'
b. Online tutorials
c. Browsing for a purpose - Seeking and filtering information
d. Online tools for communication and collaboration
e. Introduction to Digital Libraries, archives, and eBooks

Learning through Internet /Videos in Education – Revisited

a. Interactive Online applications (Google Earth and Google Maps)

b. Online video resources and video channels (Teacher Tube, YouTube, etc.)

c. Sketch casting technique and animation in education (Case Study: The Khan Academy)

Using Digital Camera in Education

(Examples for different content/subject and pedagogy areas - Methods of Teaching, Child Development, Classroom Management, Practicum, etc.)

a. Power of Pictures/photographs

b. Developing local content using a digital camera

c. 'Shoot and share' - Sharing experiences

Interactive Games and Puzzles

a. Exploring resources and applications, subject-wise (language, Science, Mathematics, etc.)

b. Digital Applications - From Toys to Learning Tools

Trainees to design a storyboard of an educational game; Or design a puzzle online

Planning for ICTs Integration

a. Planning for ICTs Integration (SWOT analysis, building support networks, etc.)

b. Developing a Technology Plan for Classroom and School

c. Barriers for effective ICT use in schools and suggestions

Unit-3:

Collaborative Learning using ICTs

Enhancing Opportunities for Collaborative Learning

a. Collaborative projects (using email, Google Docs/presentations, etc.) – folk tales/cultural stereotypes, learning about communities, and other projects)

- Pakistan Studies
- English/Urdu – Using email or Google Docs to write a collaborative "Rotating Story" (Project)
- Civics, etc.

b.Using Wikis and Blogs – an introduction

Unit-4:

ICTs for Life-long Learning and Teacher Professional Development

ICTs for life-long learning and teacher professional development

d. Why life-long learning?

e. Planning – an information resource (TL resources on WWW, Wikipedia, National curriculum, etc.)

f. Learning content and methods

g. ICT/Collaborative Tools for Teachers (Emails, discussion groups, chat, mailing lists, a professional forum, etc.)

h. Teaching-learning and assessment tools (templates, lesson plans, worksheets, online tests-IELTS, etc.)

i. Video/teleconferencing (Skype)

j. eLearning and Blended Learning (Introduction)

Continued - ICTs for life-long learning and teacher professional development

Unit-5:

Evaluating ICT Tools and Resources for Use

Evaluating ICT tools and resources (1 week - 2 hours)

a. Making decisions on identifying ICT resources: Assessing quality and usability of ICT resources with the help of rubrics
b. Assessing the quality of websites and other Internet applications, educational games, etc. (Gathering and analyzing information)

Teaching-learning Strategies

Various teaching and learning methods will be used during the course. Students will be focused on developing content knowledge as well as skills and dispositions. Critical reflection and collaboration in learning and teaching as a means of personal and professional growth will be an important consideration throughout the course. Practical strategies to promote personal and professional development will also be introduced. These include cooperative learning, discussion, inquiry, and lectures.

Assignments

Assignments will be given with a blend of individual tasks, group projects, and presentations. Student Teachers will be asked to explore their learning environment, focus deficiencies, if any, and suggest ways to improve the condition. Let them evaluate their role as learners and propose what sort of tasks they should perform as good learners.

Assessment and Examinations

Formative and summative assessments will be done during and at the end of the semester through midterm, assignments, presentations, pop-up quizzes, and final semester examinations.

Sr. No.	Elements	Weightage	Details
1	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2	Formative Assessment	25%	It is a continuous assessment. It includes classroom participation, attendance, assignments, and presentations, homework, attitude and behavior, hands-on activities, short tests, quizzes, etc.
3	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on a term paper, research proposal development, field work, and report writing, etc.

Textbook

1. Assar, S. (2015). Information and Communications Technology (ICT) and Education.

Suggested Readings

1. Majumdar, S. (2015). Emerging trends in ICT for education & training. *Gen. Asia Pacific Reg. IVETA*.
2. Kumar, R. (2008). Convergence of ICT and Education. *World Academy of Science, Engineering and Technology*, *40*(2008), 556-559.
3. Bingimlas, K. A. (2009). Barriers to the successful integration of ICT in teaching and learning environments: A review of the literature. *Eurasia Journal of Mathematics, science and technology education*, *5*(3), 235-245.
4. Player-Koro, C. (2012). Factors influencing teachers' use of ICT in education. *Education Inquiry*, *3*(1), 93-108

Additional Majors/Areas of Specialization

a) ICT in Education (Area of Specialization)

Title of Course: **Fundamental of Web Development**

Course Code: MCTE-401 IT

Course Description

This is an undergraduate course for prospective ICT expert in education. This course, with assessment as its primary focus, includes understanding the content measured by using data to improve student learning. The course also provides special emphasis related to the nature of assessment and learning in academic settings for technology education. This course introduces web development and client-side scripting. After providing a review of HTML5 and CSS, the course provides exposer to the concepts of web programming using client-side and server-side scripting. The course covers basic construction of web page, cascading style sheet, java script, MySQL, and server-side scripting using PHP.

Semester: VII

Credit Hours 03

Pre-requisites course requirements/ skills: Digital Literacy

Learning Outcomes

After completion of this course students will be able to:

1. Write HTML and understand how to effectively implement it in the web environment.
2. Use the HTML Document Object Model (DOM) to manipulate and organize a web page.
3. Write CSS effectively to create well organized, styled web pages.
4. Identify the list of frontend frameworks that would be required to implement the frontend.
5. Make the application interactive by deploying JavaScript
6. Write server-side scripting using PHP programming
7. Create and Use Relational Databases with MySQL
8. Integrate Database with PHP

Contents

Unit 01 Building Web Pages with HTML

1.1 HTML5

1.2 Using HTML5

1.3 Using Global Attributes Setting Paragraph Styles Applying Character Styles Displaying Special Characters

1.4 Working with Images and Image Maps Adding Hyperlinks and Bookmarks Defining Forms

1.5 Creating Tables

1.6 Using New HTML5 Tags

1.7 Understanding Deprecated HTML Tags

1.8 HTML Authoring Resources

Unit 02 Styling with CSS

2.1 Creating CSS Attaching CSS Understanding CSS Rules Selecting What to Format

2.2 CSS Properties and Values Applying CSS Concepts Using Text Properties

2.3 Implementing Page Properties

2.4 Laying Out with CSS

Unit 03 Adding Dynamic Elements with JavaScript

3.1 Introducing JavaScript

3.2 Characteristics of JavaScript

3.3 JavaScript Introduction

3.4 Using JavaScript with HTML Pages

3.5 JavaScript Basics

3.6 Writing and Testing JavaScript

3.7 Parts of JavaScript

3.8 Variables and Constants

3.9 Operators

3.10 Statements and Expressions

3.11 Functions

3.12 Objects

3.13 Control Structures

3.14 If/Else Statements

3.15 While and Do-While Statements

3.16 For Statement

3.17 Switch Statements

3.18 Introducing Event Handlers

3.19 Placing Event Handlers in Your Code

3.20 Understanding Event Handler Syntax and Usage

3.21 Working with the Window Event Handlers

3.22 Creating Forms Using HTML Using JavaScript in Forms

3.23 Naming Forms on a Web Page

3.24 Validating a Form

3.25 Understanding Validation

3.26 Using Validation with Passwords

Unit 04 Fundamentals of PHP

4.1 About PHP

4.2 Tools Needed for PHP

4.3 Preparing a PHP Workstation

4.4 PHP Introduction

4.5 Integrating PHP with HTML Writing and Testing PHP PHP Basics

4.6 Parts of PHP

4.7 Types of Information Variables and Constants Operators

4.8 Statements and Expressions

4.9 Functions

Unit 05 PHP Control and File Handling

5.1 Control Structures

5.2 if/else Statements

5.3 while and do-while Statements for and foreach Statements switch Statements

5.4 PHP File and Directory Management

5.5 Basic File Functions

5.6 Additional File Functions

5.7 Cookies and Session and Server Variables

5.8 Session Variables

5.9 Cookies

5.10 Server Variables

Unit 06 PHP Arrays and Forms

8.1 Using Arrays

8.2 Creating Arrays Working with Arrays Looping Through Arrays Sorting Arrays Navigating in Arrays

8.3 Converting Arrays to and From Strings

8.4 Joining and Splitting Arrays

8.5 Comparing Arrays

8.6 Handling Multidimensional Arrays

8.7 Building and Handling Forms Create a Form in HTML Add JavaScript to a Form

8.8 Accepting and Filing Form Data in PHP

Unit 07 Putting PHP to Use

7.1 User Authentication.

7.2 Create an Index Script

7.3 Add Registration Scripts Insert Sign-In Scripts

7.4 Attach a Site Page

Unit 08 Introduction to Relational Databases

8.1 Databases and Relational Databases Understanding Databases Understanding a Relational Database

8.2 Using phpMyAdmin

8.3 Get and install phpMyAdmin

8.4 Opening and exploring phpMyAdmin

8.5 Create and Use a Database in phpMyAdmin

Unit 09 Fundamentals of MySQL and SQL

9.1 About MySQL

9.2 Installing and Using MySQL Workbench

9.3 Understanding SQL Using MySQL

9.4 Exploring the MySQL Language Reviewing MySQL Word Usage Using MySQL Operators Exploring MySQL Functions

9.5 Implementing MySQL Command Statements

9.6 MySQL Commands

9.7 Understanding the MySQL Command Structure

9.8 Preparing the MySQL Workbench

9.9 Create Databases and Tables

9.10 Creating and Using a Database Creating a Table and Its Columns Reviewing MySQL Data Types

9.11 Insert Data into Tables

9.12 Inserting Data

9.13 Select, Replace, Update, and Delete Data in Tables

9.14 Selecting Data Replacing Data Updating Data Deleting Data

9.15 Alter, Rename, and Drop Tables and Databases

9.16 Altering Tables and Databases

9.17 Renaming Tables

9.18 Dropping Tables and Databases

9.19 Create and Use Events, Views, and Triggers

9.20 Using Events Using Views Using Triggers

Unit 10 Using a MySQL Database with PHP

10.1 Bringing PHP and MySQL Together Database Manipulation Database Information Database Administration

10.2 Combining PHP MySQL Functions

10.3 Working with Forms and Databases Expanding PHP Form Handling Facilitating User

10.4 Interaction Interacting with a Database Improving Security

Teaching-learning Strategies

Outcome-Based Education (OBE) approach may be used in this course. a student-centric learning model that helps teachers to plan the course delivery and assessment with the end point in mind. Activities in this course may include practical tasks which will be performed after the completion other assignments reading in the textbook, supplemental textbooks, and/or handouts; lectures; group discussions; oral presentations by class members; guest speakers; in class activities, and/or computer-based tutorials. Each student is encouraged to read scheduled topics in advance of their class.
The instructor will use OBE approach during class lectures and demonstrations (e.g., HTML, JavaScript, CSS, SQL, PHP). Students are required to have theoretical knowledge and practical skill about technologies taught in this course as outcome of this course.
Assignments- Types and Number with calendar

Class participation is required. All students are expected to respond to questions regarding the reading material and contribute to class discussions. The questions will cover material from the readings and class discussions. Test project described separately, presentations, pop-up quizzes, and interpretive exercises will be given. Individually.
assessment and Examinations:

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Textbooks.

1. Welling, L., & Thomson, L. (2003). *PHP and MySQL Web development*. Sams Publishing.

Suggested Readings

1. Duckett, J. (2014). *Web design with HTML, CSS, JavaScript, and jQuery set* (Vol. 1). IN: Wiley.
2. Robbins, J. N. (2012). *Learning web design: A beginner's guide to HTML, CSS, JavaScript, and web graphics*. " O'Reilly Media, Inc.".

3. Thomson, L., & Welling, L. (2003). *PHP and MySQL Web development*. Sams

Title of Course: **Online Learning Management Systems**

Course Code: MCTE-402 IT

Course Description

This is an undergraduate course for prospective ICT expert in education. This course, with assessment as its primary focus, includes understanding the content measured by using data to improve student learning. The course also provides special emphasis related to the nature of assessment and learning in academic settings for technology education. This course introduces learning management system (LMS) and software technologies for online teaching and learning. After providing a review of learning management system and its related technologies. The course covers basic of LMS, Analysis of available LMS, Security and Privacy Management for LMS, guideline Choosing the Appropriate E-Learning System, Preparing Faculty for a Learning Management System Transition, integration of Plagiarism Detection Tools in LMS, using a Learning Management System to Facilitate Learning Outcomes Assessment, and installation & customization of LMS.

Semester: VII

Credit Hours 03

Pre-requisites course requirements/ skills: Digital Literacy, fundamental of Web Development

Learning Outcomes

After completion of this course students will be able to:

1. Understand Learning Management Systems
2. Select a Suitable Learning Management System
3. Work with Supporting Technologies for Student Tracking, Evaluation, and Synchronous Course Delivery
4. Install Learning Management System
5. Install Database of Learning Management System
6. Customization in Open source LMS according to Requirements
7. Know about best Practices in Online Education

Contents

Unit 01 An Overview of Learning Management Systems

1.1 What is LMS

1.2 Need of LMS

1.3 Benefit of LMS

Unit 02 E-Learning Platform

2.1 What is E-Learning Platform

2.2 Software for E-learning

2.3 Analysis of E-learning Platform

Unit 03 Security and Privacy Management for Learning Management Systems

3.1 Security and Privacy Goals in LMS infrastructures

3.2 LMS assets: infrastructure Components and valuable information

3.3 Computer Security and information Security Management goals

Unit 04 Choosing the Appropriate E-Learning System

4.1 E-learning

4.2 e-Learning at educational institutions

4.3 Stakeholders involved and their requirements for Choosing an e-Learning System.

4.4 Pedagogical aspects of e-learning system

Unit 05 Preparing Faculty for a Learning Management System Transition

5.1 Disposition towards technology and Change

5.2 preparation and prior experiences

5.3 adequate, appropriate, and timely Support

5.4 Survey on need of LMS

5.5 Analysis of survey result

Unit 06 Plagiarism Detection Tools in Learning Management Systems

6.1 Concept of Plagiarism detection

6.2 plagiarism Detection Methods

6.3 plagiarism Detection software.

Unit 07 Using a Learning Management System to Facilitate Learning Outcomes Assessment

7.1 Electronic Outcomes assessment.

7.2 Outcome's assessment.

7.3 Outcome's assessment and Learning Management Systems

Unit 08 Integrating New Open-Source Assessment Tools

8.1 What is Open-source software

8.2 Overview of Moodle Architecture

Unit 09 Installation of LMS

9.1 Downloading open source LMS e.g., Moodle

9.2 Configuring Database

9.3 Customizing LMS

Unit 10 Best Practices for Teaching and Designing an Online Classroom

10.1 Concept of Smart Classroom

10.2 Traditional vs online classroom

10.3 The Hybrid Online Classroom

Teaching-learning Strategies

Outcome-Based Education (OBE) approach may be used in this course. a student-centric learning model that helps teachers to plan the course delivery and assessment with the end point in mind. Activities in this course may include practical tasks which will be performed after the completion other assignments reading in the textbook, supplemental textbooks, and/or handouts; lectures; group discussions; oral presentations by class members; guest speakers; in class activities, and/or computer-based tutorials. Each student is encouraged to read scheduled topics in advance of their class.
The instructor will use OBE approach during class lectures and demonstrations (e.g., learning management installation, configuration, customization, and database management). Students are required to have theoretical knowledge and practical skill about technologies taught in this course as outcome of this course.

Assignments- Types and Number with calendar

Class participation is required. All students are expected to respond to questions regarding the reading material and contribute to class discussions. The questions will cover material from the readings and class discussions. Test project described separately, presentations, pop-up quizzes, and interpretive exercises will be given. Individually.

Assessment and Examinations:

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper,.

Textbooks.

- Van Deursen, A. J., & Van Dijk, J. A. (2014). *Digital skills: Unlocking the information society*. Springer.".

Suggested Readings

- Robbins, J. N. (2012). Learning Web Design Fourth Edition: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics.

- Foreman, S. (2017). *The LMS guidebook: Learning management systems demystified*. American Society for Training and Development.

Title of Course: **Development of Digital Skills**

Course Code: MCTE-403 IT

Course Description

This is an undergraduate course for prospective ICT expert in education. This course, with assessment as its primary focus, includes understanding the content measured by using data to improve student learning. The course also provides special emphasis related to the nature of assessment and learning in academic settings for technology education. This course is designed to offer digitally literate skills and capabilities across several domains, including the ability to use technology, find, use, and critically evaluate information. Curate data and media sources, communicate, collaborate, and participate in online environments Learners will gain deep insights into how smartness is being harnessed from data and appreciate what needs to be done to overcome some of the challenges.

Semester: VIII
Credit Hours : 3
Pre-requisites course requirements/ skills: Digital Literacy

Learning Outcomes

After completion of this course students will be able to:

1. Raise awareness of digital skills being used in the workplace
2. Ways of teaching digital skills
3. Manage a digital identity
4. Manage digital information
5. Create basic digital content
6. Publish digital content
7. Know about Content Management System Platform
8. Use of content Management System

Contents

Unit 01 Digital Skills Awareness

1.1 General Technologies - Working with files: MS Office applications, browsers, search engines.

1.2 Learning Technologies - Learning environments, forums, assignments, video, conferencing.

1.3 Access, Sharing and Safety - Accounts, access, safety, social media, sharing, email.

1.4 Getting Organized - Note taking, referencing, digital wellbeing, time management.

1.5 Digital Learning and Self Development - Complete the Jisr Digital Discovery Tool.

1.6 Digital Identity and Well Being - Computer Security and Internet Safety, LinkedIn for Students, Digital Citizenship.

Unit 02 Ways of teaching digital skills

2.1 Creating CSS Attaching CSS Understanding CSS Rules Selecting What to Format

2.2 CSS Properties and Values Applying CSS Concepts Using Text Properties

2.3 Information literacy

2.4 Ethical use of digital resources

2.5 Understanding digital footprints

2.6 Protecting yourself online

2.7 Handling digital communication

2.8 Cyberbullying

Unit 03 Manage a digital identity

3.1 What is Digital identity

3.2 What is personal Identity

3.3 Comparing Identity Management to Data Loss Prevention

3.4 Digital Identities Typical Protection

3.5 Identity and Access Management in practice with example

3.6 Attributes And Assertions

Unit 04 Manage digital information

4.1 Establish a schedule for checking your email

4.2 Categorize emails immediately

4.3 Consider how many social media accounts you really need

4.4 Use a dashboard tool for managing your social media accounts

4.5 Turn off your mobile phone -- or limit texting to specific times

4.6 Use a project management tool to keep yourself and your team on track

Unit 05 Create basic digital content

5.1 Choose the type of content you will create

5.2 Set goals and objectives

5.3 Leverage social media insights and analytics

5.4 Perform A/B testing

5.5 Track your reach

5.6 Implement an SEO program

Unit 06 Publish digital content

6.1 Digital publishing platform.

6.2 Interactive content creation

Unit 07 content Management System

7.1 Theoretical Perspectives

7.2 Set up a domain and hosting account

7.3 Set up a MySQL database on their server

7.4 Install WordPress on the MySQL database

7.5 Plan their website by choosing color schemes, fonts, layouts, and more

7.6 Search for themes in WordPress

Unit 08 Advance level of content Management System

8.1 Select, install, and activate a theme

8.2 Add posts to their website

8.3 Create website pages

8.4 Add images, photo galleries, and more

8.5 Create tags for SEO and categories to organize their posts

8.6 Use WordPress as a content management system (CMS)

8.7 Use widgets and plugins

8.8 Create an ecommerce site

8.9 Integrate WordPress with social media

8.10 Customize a WordPress site using PHP, CSS, and HTML

Teaching-learning Strategies

Outcome-Based Education (OBE) approach may be used in this course. a student-centric learning model that helps teachers to plan the course delivery and assessment with the end point in mind. Activities in this course may include practical tasks which will be performed after the completion other assignments reading in the textbook, supplemental textbooks, and/or handouts; lectures; group discussions; oral presentations by class members; guest speakers; in class activities, and/or computer-based tutorials. Each student is encouraged to read scheduled topics in advance of their class.
The instructor will use OBE approach during class lectures and demonstrations (e.g., WordPress). Students are required to have theoretical knowledge and practical skill about technologies taught in this course as outcome of this course.

Assignments- Types and Number with calendar

Class participation is required. All students are expected to respond to questions regarding the reading material and contribute to class discussions. The questions will cover material from the readings and class discussions. Test project described separately, presentations, pop-up quizzes, and interpretive exercises will be given. Individually.

Assessment and Examinations:

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Textbooks.

- Van Deursen, A. J. A. M., Helsper, E. J., & Eynon, R. (2014). Measuring digital skills. *From digital skills to tangible outcomes project report*.

Suggested Readings

Van Deursen, A. J. A. M., Helsper, E. J., & Eynon, R. (2014). Measuring digital skills. *From digital skills to tangible outcomes project report*.

Title of Course: **Digital Tools for Instructors and Learners**

Course Code: MCTE-404 IT

Course Description

This is an undergraduate course for prospective ICT expert in education. This course, with assessment as its primary focus, includes understanding the content measured by using data to improve student learning. The course also provides special emphasis related to the nature of assessment and learning in academic settings for technology education. This course provides an introduction in the new era of learning, technology plays a fundamental role in the processes of teaching children and adolescents. Here are tools that facilitate communication between teachers and students, among other things.

- **Semester: VIII**
- **Credit Hours :3**
- **Pre-requisites course requirements/ skills:** Digital Literacy

Learning Outcomes

After completion of this course students will be able to:

1. Theoretical Perspectives of Digital Education
2. Use Google Classroom for classroom management.
3. Know about a game-based learning approach using Kahoot.
4. Use of video conference tool for online session with students.
5. Know future of Education
6. Know about future Industry
7. Know about future Jobs
8. Skill required in future industry

Contents

Unit 01 Theoretical Perspectives of Digital Education

1.1 Modified, Multiplied, and (Re-) mixed: social media and Digital Literacies

1.2 Research on Web 2.0 Digital Technologies in Education

1.3 The Role of Adult Educators in the Age of social media

1.4 Educational Networking in the Digital Age

1.5 Integrating Digital Technologies in Education: A Model

1.6 for Negotiating Change and Resistance to Change

Unit 02 Getting Started Google Classroom

2.1 First Login

2.2 Create and Customize Your Class

2.3 Add Class Details

2.4 Add Class Materials

2.5 Adding Students

Unit 03 The Stream

3.1 The Stream in Google Classroom

3.2 Comment Settings

3.3 Student's View: The Stream

Unit 04 Announcements & Questions

4.1 Create Announcements & Questions

4.2 Student's View: Announcements & Questions

Unit 05 Assignments

5.1 Create Assignments

5.2 Student's View: Assignments

5.3 Student's View: Assignment Details

5.4 Student's View: Turn in Assignments

5.5 Student's View: Unsubmitted Assignments

5.6 Managing Assignments: The Stream

5.7 Managing Assignments: Assignment Details

5.8 Grading Assignments

5.9 Reviewing All Assignments

5.10 Student's View: All Assignments

5.11 Reusing Posts

Unit 06 Communication

6.1 Google Calendar Integration

6.2 Google Drive Folder Structure

Unit 07 Game based learning Approach using Kahoot

7.1 What is Kahoot

7.2 Why to use Kahoot

7.3 Signup in Kahoot

Unit 08 Getting Start Kahoot

8.1 Dashboard of Kahoot

8.2 Quiz in Kahoot

8.3 Jumble in Kahoot

8.4 Discussion in Kahoot

8.5 Creating Quiz

8.6 Playing Kahoot Quiz

8.7 Team Competition in Kahoot

Unit 09 Education 4.0

3.1 What is Education 4.0

3.2 Why Education 4.0

3.3 Preparing students for evolving industries

3.4 A new approach to learning

3.5 Learning orientation and analytical mindset

3.6 Major trends of Education 4.0

Unit 10 Industry 4.0

10.1 What is Industry 4.0

10.2 Industrial Revolutions and Future

10.3 The digital transformation of industry and the fourth industrial revolution

10.4 Principles of "Smart Factory"

10.5 Industry 4.0 Key Principles

10.6 Automation

10.7 Industry 4.0 and the Industrial Internet

10.8 Industry 4.0 strategy & implementation

10.9 Industry 4.0 challenges & risks

10.10 Leadership & technology in Industry 4.0

Teaching-learning Strategies

Outcome-Based Education (OBE) approach may be used in this course. a student-centric learning model that helps teachers to plan the course delivery and assessment with the end point in mind. Activities in this course may include practical tasks which will be performed after the completion other assignments reading in the textbook, supplemental textbooks, and/or handouts; lectures; group discussions; oral presentations by class members; guest speakers; in class activities, and/or computer-based tutorials. Each student is encouraged to read scheduled topics in advance of their class.
The instructor will use OBE approach during class lectures and demonstrations (e.g., Google Classroom, Kahoot, and Video Conferencing Tool). Students are required to have theoretical knowledge and practical skill about technologies taught in this course as outcome of this course.

Assignments- Types and Number with calendar

Class participation is required. All students are expected to respond to questions regarding the reading material and contribute to class discussions. The questions will cover material from the readings and class discussions. Test project described separately, presentations, pop-up quizzes, and interpretive exercises will be given. Individually.

Assessment and Examinations:

Sr. No.	Elements	Weightage	Details
1	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance,

			assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Textbooks.

- Ecclesfield, N., & Garnett, F. (Eds.). (2020). *Digital Learning: Architectures of Participation: Architectures of Participation*. IGI Global.

Suggested Readings

- Qasem, Y. A., Abdullah, R., Atan, R., & Jusoh, Y. Y. (2019). Cloud-Based Education as a Service (CEAAS) System Requirements Specification Model of Higher Education Institutions in Industrial Revolution 4.0. *Int. J. Recent Technol. Eng. (IJRTE)*, *8*, 1386-1392.

- Ellahi, R. M., Khan, M. U. A., & Shah, A. (2019). Redesigning Curriculum in line with Industry 4.0. *Procedia computer science*, *151*, 699-708.Google Classroom Teacher Guide 2021

b). Computer Hardware Technology (Area of Specialization)

Course Title: Personal Computer Hardware

Course Code: MCTE-401 CH

Course Description

This course is a study of current personal computer hardware including personal computer assembly and upgrading, setup and configuration, and troubleshooting.

- **Semester: VII**
- **Credit Hours: 3**
- **Pre-requisites course: ICTs**

Course Objectives:

The primary objective of this course is to help students prepare for entry-level positions in the ICT field. Job titles include enterprise technician, IT administrator, and field service technician, call center technician, help desk technician and PC or support technician. In addition, the curriculum helps students gain confidence with the components of desktop and laptop computers by teaching the proper procedures for hardware and software installations, upgrades & troubleshooting.

Learning Outcomes

- Define information technology (IT) and describe the components of a personal computer
- Perform a step-by-step assembly of a desktop computer and install and navigate an operating system.
- Explain and perform preventive maintenance.
- Explain the steps of the troubleshooting process and perform basic troubleshooting
- Configure computers to attach to an existing network
- Implement basic physical and software security principles
- Apply good communications skills and professional behavior while working with customers

Contents

This course introduces the ICT industry and in-depth exposure to personal computers, hardware, and operating systems. Students learn the functionality of various hardware and software components and best practices in maintenance and safety issues.

Unit 1. Introduction to the Personal Computer

1.1 Explain IT industry certifications.
1.2 Describe a computer system.
1.3 Identify the names, purposes, and characteristics of internal components
1.3.1 Identify the names, purposes, and characteristics of Motherboards
1.3.2 Identify the names, purposes, and characteristics of Processor
1.3.3 Identify the names, purposes, and characteristics of Memory.
1.3.4 Identify the names, purposes, and characteristics of Adapter cards

1.3.5 Identify the names, purposes, and characteristics of storage drives
1.3.6 Identify the names, purposes, and characteristics of cases and power supplies / cooling System.

Unit 2. Computer Assembly

2.1 Attach the components to the motherboard and install the motherboard
2.2 Install internal drives
2.3 Install adapter cards
2.4 Identify the names, purposes, and characteristics of CMOS & BOIS
2.4.1 BOIS Upgrading, Configurations & Updating.

Unit 3. Fundamental Printers and Scanners

3.1 Identify the names, purposes, and characteristics of input / output devices

3.1.1 Explain system resources and their purpose

3.2 Describe the types of printers currently available
3.2.1 Describe laser printers
3.2.2 Describe impact printers
3.2.3 Describe ink jet printers
3.2.4 Describe solid-ink printers
3.2.5 Describe other printer types
3.3 Describe the installation and configuration process for printers
3.3.1 Describe how to share a printer
3.4 Describe the types of scanners currently available
3.4.1 Describe scanner types, resolution, and interfaces
3.4.2 Describe all-in-one devices
3.5 Identify and apply common preventive maintenance techniques for printers and scanners
3.6 Identify common problems and solution

Unit 4. Fundamental Operating Systems

4.1 Explain the purpose of an operating system
4.1.1 Describe the characteristics of modern operating systems
4.1.2 Describe and compare operating systems to include purpose
4.1.3 Describe desktop & network operating systems
4.1.4 Identify applications and environments that are compatible
4.1.5 Determine minimum hardware requirements and compatibility
4.2 Install an operating system
4.2.1 Prepare hard drive
4.2.2 Install the operating system using default settings
4.3 Troubleshoot operating systems
4.3.1 Review the troubleshooting process
4.3.2 Identify common problems and solutions

Unit 5. Hard-Disk management & partition

5.1 Hard-Disk management.
5.1.1 External storage devices
5.1.2 Installation of Peripherals and configuring them.
5.1.3 Handling of Synthetic and Effective tools.

Unit 6. Software Installation & Troubleshooting

6.1 How to install software in PC.
6.2 Common symptom / problem during installation & after installation
6.3 Difference Between x86 & x64.
6.4 Explain how to install service packs and security patches

Unit 7. Fundamental Security

7.1 Explain why security is important
7.2 Describe security threats
7.2.1 Define viruses, worms, and Trojans
7.2.2 Explain web security
7.2.3 Define adware, spyware, and grayware
7.2.4 Describe spam and popup windows
7.2.5 Explain data wiping, hard drive destruction and recycling
7.3 Identify security procedures
7.3.1 Explain what is required in a basic local security policy
7.3.2 Explain the tasks required to protect physical equipment
7.3.3 Describe ways to protect data
7.4 Identify common preventive maintenance techniques for security
7.4.1 Explain how to update signature files for anti-virus software
7.4.2 Identify common problems and solutions

Unit 8. Preventive Maintenance and Troubleshooting

8.1 Explain the purpose of preventive maintenance

8.1.1 Identify the steps of the troubleshooting process

8.1.2 Explain the purpose of data protection
8.1.3 Identify the problem

8.1.4 Implement the solution

8.1.5 Verify solution and full system functionality

Unit 9. Fundamental Laptops and Portable Devices

9.1 Describe laptops and other portable devices
9.1.1 Identify some common uses smartphones
9.2 Identify and describe the components of a laptop
9.2.1 Describe the components found on the outside of the laptop
9.2.2 Describe the components found on the inside of the laptop
9.3 Compare and contrast desktop and laptop components
9.4 Explain how to configure laptops
9.4.1 Describe how to configure power settings
9.4.2 Describe the safe installation and removal of laptop components
9.5 Describe wireless communication methods for laptops
9.5.1 Describe Bluetooth technology
9.5.2 Describe infrared technology
9.5.3 Describe cellular WAN technology
9.5.4 Describe Wi-Fi technology

Unit 10. Fundamental Networks
10.1 Explain the principles of networking
10.1.1 Define computer networks
10.1.2 Explain the benefits of networks
10.1.3 Describe topologies
10.2 Describe types of networks
10.2.1 Describe a LAN
10.2.2 Describe a WAN
10.2.3 Explain peer-to-peer networks
10.2.4 Over-view about the client/server networks
10.3 Describe basic networking concepts and technologies
10.3.1 Describe IP addressing
10.3.2 Define DHCP
10.3.3 Describe the physical components of a network
10.3.4 Identify names, purposes, and characteristics of network devices

Teaching-learning Strategies

Students in both the traditional class and on the Internet, class will have access to this course via WebCT. Students in the traditional class will meet regularly for lecture over the material. Students in the Internet class will only be required to meet with the instructor for testing; however, Internet students are always welcome to attend the traditional class (especially for exam reviews). Resources provided through
WebCT includes:

- A calendar displaying assignments each week (please check often)
- Online assignments
- Chapter notes
- Email (totally contained within WebCT)

Assignments

The following items will be assigned during the semester and used to calculate the student's final grade:

We will work through each of the learning modules which correspond to the chapters in your textbook. At the end of each learning module, you will complete a Labs project demonstrating ITSC 1325 _ 030608 3 of 5 your knowledge of the programming concepts presented in the learning module. Projects will be submitted to me according to the schedule provided using the online drop box in the Assignments link of WebCT.

Assessment and Examinations

Assessment will be done as per university/department policy.

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework,

			attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Textbooks

1. Thompson, R. B., & Thompson, B. F. (2003). *PC hardware in a nutshell: a desktop quick reference*. " O'Reilly Media, Inc.".

Suggested Readings

1. For current texts and materials, use the following link to access bookstore listings: http://www.panola.edu/collegestore.htm • For testing services, use the following link: http://www.panola.edu/instruction/d
2. Mueller, S. (2001). *PC-Hardware-Superbibel*. Markt-und-Technik-Verlag.

Title of Course: DIGITAL LOGIC DESIGN

Course Code: MCTE-402 CH

Course Description

One of the main goals of this course is to teach students the fundamental concepts in classical digital design and to clearly demonstrate the way in which digital circuits are designed and analyzed today. The purpose is to make students familiar with modern hierarchy of digital hardware and enlighten them the state-of-the-art computer hardware design methodologies. Moreover, the contents of the course provide students the basic idea of how to design and simulate logic circuits.

- **Semester: VII**
- **Credit Hours: 3**
- **Pre-requisites course: ICTs**

COURSE OBJECTIVES

The main objective of the said course is to make student able to understand number representation and Boolean algebra. Combinational circuit analysis and design. K-map and tabulation methods. Multiplexers, decoders, adders/subtractors and PLD devices. Sequential circuit analysis and design. Registers, counters, and recognizers

COURSE LEARNING OUTCOMES

1. Identify and explain fundamental concepts of digital logic design including basic and universal gates, number systems, binary coded systems, basic components of combinational and sequential circuits

2. Demonstrate the acquired knowledge to apply techniques related to the design and analysis of digital electronic circuits including Boolean algebra and multi-variable Karnaugh map methods
3. Analyze small-scale combinational and sequential digital circuits
4. Design small-scale combinational and synchronous sequential digital circuit using Boolean algebra and K-maps

COURSE CONTENTS

1. **Binary Systems**
    - Introduction
    - Number Systems and Conversions
    - Arithmetic with number systems
    - Signed and unsigned number systems and their arithmetic
    - Binary Codes
2. **Boolean Algebra & Logic Gates**
    - Boolean Postulates & Theorems
    - Boolean Functions and their Complements
    - Sum of Min Terms & Product of Max Terms
    - Standard forms & Canonical Forms
    - Digital logic gates
3. **Gate level Minimization**
    - Karnaugh maps
    - Multi-variable (2,3,4,5) K-maps
    - Don't care conditions
    - Digital Circuits using Basic and Universal Gates
4. **Combinational Logic**
    - Analysis and Design
    - Code Converters
    - Adders & its types
    - Subtractors, Multiplier
    - Magnitude Comparator
    - Decoders and Encoders
    - Multiplexers
5. **Sequential Circuits**
    - Latches (SR Latch, D Latch)
    - Flip Flops (D Flip Flop, JK Flip Flop, T Flip Flop)

- Characteristic Tables, Characteristic Equations.
- Design and Analysis of Clocked Sequential Circuits (State Equations, State Tables, State Diagrams)
- Designing Counters

6. **Registers & Counters**
   - Simple registers
   - Registers with parallel Load
   - Shift Registers/Serial to parallel Convertors
   - Universal Shift Register
   - Asynchronous and Synchronous Counters
   - Ripple, Binary, BCD, & Johnson Counters

Teaching-learning Strategies

Besides the formal introductory lectures on the topics mentioned above each graduate student will write a complete Company Health and Safety Accident Prevention Program for a specific type of industry. List of company/industry will be provided by the department. A presentation to the class on the hazards of that industry will also be provided.

Assignments

Assignments will be given with a combination of mini tasks, projects, and presentations.

- **Assessment and Examinations**
  Assessment will be done as per university/department policy.

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, a, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Textbooks

- Mano, M. M. *Digital Design: For Anna University, 4/e*. Pearson Education India.

Suggested Readings

- Tocci, R. J. (1991). *Digital systems: principles and applications*. Pearson Education India.

- Jain, R.P.; Logic Design Digital Principles, 3rd Ed, Roger L Tokheim; Shaum's Outlines Series.

Title of Course: Computer Architect & Components

Course Code: MCTE-403 CH

Course Description

This course is designed to introduce fundamentals of computer design; quantifying cost and performance; instruction set architecture; program behavior and measurement of instruction set use; processor data paths and control; pipelining, handling pipeline hazards; memory hierarchies and performance; I/O devices, controllers, and drivers; I/O and system performance.

- **Semester: VII**
- **Credit Hours: 3+1**
- **Pre-requisites course: ICTs**

COURSE OBJECTIVES

On successful completion of this course students will be able to:

1 Discuss how a modern computer works
2 Explain how it supports execution of software
3 Explain how design alternatives affect performance and cost.

COURSE LEARNING OUTCOMES

1. Identify and explain fundamental concepts of digital logic design including basic and universal gates, number systems, binary coded systems, basic components of combinational and sequential circuits
2. Demonstrate the acquired knowledge to apply techniques related to the design and analysis of digital electronic circuits including Boolean algebra and multi-variable Karnaugh map methods
3. Analyze small-scale combinational and sequential digital circuits
4. Design small-scale combinational and synchronous sequential digital circuit using Boolean algebra and K-maps

COURSE CONTENTS

UNIT 1.- Abstractions, Technology and Performance of Computers.

1.1. Describe the main aspects that influence technological evolution in today's computer systems.
1.2. Recognize the basic vocabulary of computer architecture.
Teaching-learning Strategies
1.3. Identify the components of a computer system.
1.4. Understand the concept of runtime in a system.
1.5. Determine the causes and effects on the growth performance in part overall.

UNIT 2.- Pipelined Processors.

2.1. Understand the basic concepts of computer architecture. Arithmetic Logic Unit (ALU), register banks, registers and flip-flop latch, clock period, and Harvard RISC architecture.
2.2. Understand the concept of pipeline (segmentation) and the concepts associated latency and throughput.
2.3. Indicate how the pipeline processor works based on the execution of overlapping instructions.
2.4. Understanding the limitations of pipelining and causes of loss of productivity.
2.5. Understand how to eliminate or mitigate structural, control and data hazards.
2.6. Describe techniques to avoid halts. Internal forwarding and branch prediction using static and dynamic BTB.

UNIT 3.- Memory Organization and Structure: caches and virtual memory

3.1. Understand the concept of memory hierarchy. Reasons why the different storage levels are organized into hierarchy.
3.2. Recognize the need and utility of cache memories and the organization in fully associative, direct mapped and set associative.
3.3. Indicate operating schemes of caches. Write Through with assignment in writing and without writing assignment. Post-write or writeback.
3.4. Understand replacement algorithms and cache coherence problems on multiprocessor systems.
3.5. Understand the operation of virtual memory: paging, segmentation, and paged segmentation.
3.6. Indicate steps in the translation of virtual addresses to physical or real addresses.
3.7. Understand the necessary hardware support in the memory management unit (MMU) and translation look-aside buffer (TLB).
3.8. Understanding the integration of memory system between cache and TLB (cache system with virtual addresses cache or real addresses cache.)

UNIT 4.- Storage and other aspects of the input / output (I / O).

4.1. Understand and differentiate the concepts of reliability and availability.
4.2. Recognize the key features of storage in disks and flash memory.
4.3. Indicate the main performance metrics in the input-output systems.
4.4. Identify the main possibilities that can be applied to parallelize the input / output.

UNIT 5.- Advanced Techniques of parallelism.

5.1. Understanding the instruction level parallelism (ILP) and the base of the superscalar processors.
5.2. Knowing the basics of superscalar processors: policies of instructions issued, renaming registers, reordering buffer, retirement unit.
5.3. Design a superscalar processor based on the previously studied under item 2.
5.4. Understanding processors where the parallelism is solved by the compiler instead of hardware (VLIW processors).

Teaching-learning Strategies

Students are expected to engage in self-directed learning from the textbook for the course and related resources. Guidance will be provided, specifying sections of the textbook to be studied in each week of the semester. There will be one 2-hour lecture each week covering the specified sections of the textbook. Selected exercises from the textbook will be suggested for practice, and sample solutions will be made available for reference at the end of each week.
Homework problems based on the specified sections of the textbook will be set throughout the semester. Students will be required to submit solutions for assessment.
There will be a practical assignment involving programming work related to the textbook material. Collaborative learning is supported through on-line discussion forums on the School of Computer Science's Moodle web site. Teaching staff will participate in the discussion forums. **Assignments**

Assignments will be given with a combination of mini tasks, projects, and presentations.

- **Assessment and Examinations**
  Assessment will be done as per university/department policy.

Sr. No.	Elements	Weightage	Details
1	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Textbooks

22. Estructura y diseño de computadores: La interfaz software/hardware. D.A. Patterson y J.L. Hennessy. Ed. Reverte 2011. ISBN: 978-84-291-2620-4. Ref_UAM: INF/681.32.3/PAT.

Suggested Readings

23. Corliss, M. L., & Hendry, R. (2009). Larc: A little architecture for the classroom. *Journal of Computing Sciences in Colleges*, *24*(6), 15-20.

Title of Course: Micro- controller Programming

Course Code: MCTE-404 CH

Course Description

The course comprised of internal structure and operation of microcontrollers will be studied. The design methodology for software and hardware applications will be developed through the labs and design projects.

- **Semester: VII**
- **Credit Hours: 3+1**
- **Pre-requisites course: ICTs**

COURSE OBJECTIVES

The objective of this course is to teach students design and interfacing of microcontroller-based embedded systems. High-level languages are used to interface the microcontrollers to various applications. There are extensive hands-on labs/projects. Embedded system for sensor applications will be introduced. GUI using C#

COURSE LEARNING OUTCOMES

Upon completion of this course, students will understand the architecture of the PIC microcontrollers and how to write high-level languages, and embed the code in flash memory for stand-alone system for embedded system designs

COURSE CONTENTS

(1) PIC microcontrollers: History and features
(2) CCS C Compiler and PIC18F Development System
(3) PIC Architecture & Programming
(4) PIC I/O Port Programming
(5) PIC Programming in C
(6) PIC18 Hardware Connection and ROM loaders
(7) PIC18 Timers Programming
(8) PIC18 Serial Port Programming
(9) Interrupt Programming
(10) LCD and Keypad Interface
(11) External EEPROM and I^2C
(12) USB and HID Class
(13) ADC and DAC
(14) Sensor and other Applications
(15) CCP and ECCP Programming
(16) Capture Mode Programming and Pulse Width Measurement
(17) C# RS232 Interface Programming
(18) C# GUI Plot Program
(19) Digital Oscilloscope, spectral Analyzer, and multimeter
(20) Impact of engineering solutions in a global, economic, environmental, and societal context
(21) Knowledge of contemporary issues
(22) Final Project

Teaching-learning Strategies

Students are expected to engage in self-directed learning from the textbook for the course and related resources. Guidance will be provided, specifying sections of the textbook to be studied in each week of the semester. There will be one 2-hour lecture each week covering the specified sections of the textbook. Selected exercises from the textbook will be suggested for practice, and sample solutions will be made available for reference at the end of each week.
Homework problems based on the specified sections of the textbook will be set throughout the semester. Students will be required to submit solutions for assessment.
There will be a practical assignment involving programming work related to the textbook material. Collaborative learning is supported through on-line discussion forums on the School of Computer Science's Moodle web site. Teaching staff will participate in the discussion forums. **Assignments**
Assignments will be given with a combination of mini tasks, projects, and presentations.

- **Assessment and Examinations**
  Assessment will be done as per university/department policy.

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Textbooks

- Gridling, G., & Weiss, B. CT-403: Introduction to Microcontrollers First Semester Textbook.

Suggested Readings

- Design reference notes and data sheets of Microchips.
- PO, P., & PO12, P. O. P. O. P. O. P. O. UNIT V SLIDING MODE CONTROL 12. *DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING ANNA UNIVERSITY, CHENNAI–25*, 23.

a. Drawing (Area of Specialization)

Course Title: Technical Sketching and Reproduction

Course Code: MCTE-401-ED

Type: Specialization Course

Credit Hours: 3+1

Pre-requisites: Completion of course Technical and Geometrical Drawing

Course Description

Mechanical drawing is a means of expression and communication, essential for the development of processes of scientific investigation, of mechanical projects, or of scientific intervention with the aim of creating an industrial or artistic product. Its principal function consists in formalizing or visualizing what is being designed or discovered, providing a first concretion of possible solutions, through to the final stage of development, in which results are presented in definitive plans. It is a compulsory language for all those people who communicate technically at any level and want to convert their work into a creating activity. It contributes effectively to communicating ideas at any stage of their development; in sketch phase, it is an ideal instrument to developing, through the confrontation of opinions, investigation projects or design proposals.

Learning outcomes

Upon successful completion of the course, the student will be able to:

1. acquire the basic knowledge of drawing skills.

2. apply the concepts of basic drawing techniques.

3. demonstrate individually the drawings of plan, elevation, and cross sections of machine parts.

Course Contents:

Orthographic Projection

Principle and Methods of projection, Orthographic projection, Planes of projection, First and Third-angle projection, Reference line

2. Projection of Points: Point situated in the first, second, third and fourth quadrant

3. Projection of Straight Lines Line parallel and perpendicular to one or both the planes, Line contained by one or both the planes, Projections of lines inclined to both the planes, True length of a straight line and its inclinations, Methods of determining traces of a line.

4. Projection of Planes (2D) Types and Traces of planes, Projections of planes, Projections of oblique planes

5. Projections on Auxiliary Planes (2D) Types of auxiliary planes and views, Projection of a point on an auxiliary plane, Projections of lines and planes

6. Projections of Solids (3D) Types of solids and their projections, Projections of solids with axes inclined **7. Section of Solids (3D**) Section of planes, prisms, pyramids, cylinders, cones, spheres, Methods of development, Triangulation development, Developments of lateral surfaces of right solids

8. Isometric Projections (3D) Isometric axes, lines, planes, and scale, Isometric drawing or isometric view, Isometric drawing of planes or plane figures, prisms and pyramids, cylinders, cones and sphere

Mechanical Drawing (Lab):

1. Introduction to Engineering Drawing, I. S. specification for preparation of drawings, Use of drawing instruments and materials, Basic Tools, Lines: Types, configuration and application, Selection of line thickness,

2. Lettering, Numbering and Dimensioning Vertical and inclined single stroke letters, Lettering types and rules, Dimension lines, projection lines, leaders or pointer lines, Arrow heads, Dimensioning,

3. Geometric Construction Drawing simple geometric objects (polygon, pentagon and hexagons etc).

4. Orthographic Projections of different Solids I-beam etc.

5. Orthographic Projections of Machine Elements Rivets, Nut and bolts, Different kinds of threads, Lap and butt joints, Flange couplings, Journal bearing, Open bearing, Footstep bearing, Crankshaft, Bearings

Practical:

- Select a machine and study its operation and machine elements detail.
- Draw the 3D model of the machine and draw 2D drawings.
- Apply the real mechanism to the machine.

- **Teaching-learning Strategies**
  Besides the formal introductory lectures on the topics mentioned above each graduate student will complete assignment related to graphic representation of mechanical engineering objects.
  Assignments
  Assignments will be given with a combination of mini tasks, projects, and presentations related to mechanical engineering.
- **Assessment and Examinations**

Assessment will be done based on assignments, mid semester and final semester Test. Detail is given below.

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes: classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Textbook

1. Rogers, D. F., & Adams, J. A. (1989). Mathematical elements for computer graphics McGraw-Hill Higher Education.

Recommend Readings

1. Giesecke, F. E., Mitchell, A., Spencer, H., Hill, I., Dygdon, J., & Novak, J. . *Technical drawing with engineering graphics*. Prentice HallAitkin, M. J. (1990)., London: Longman.
2. Schraidt, F (1995). Geometrical Drawing. A Collection of Plates for Practical Use in Elementary Mechanical Drawing. London: Thames and Hudson.

Course Title: **Production and Constructional Design**

Course Code: MCTE-402-ED

Semester: VII

Type: Specialization Course

Credit Hours: 3+!

Pre-requisites:

Knowledge of basic computer operations and file management. • Basic understanding of general drafting practices using both traditional hand delineation tools and computer-aided delineation (CAD).

Course Description

An in-depth study of drafting methods and principles used in civil engineering. Civil Engineering drawing is a means of expression and communication, essential for the development of processes of scientific investigation, of civil engineering projects, or of scientific intervention with the aim of creating an industrial or residential projects. Its principal function consists in formalizing or visualizing what is being designed or discovered, providing a first concretion of possible solutions, through to the final stage of development, in which results are presented in definitive plans. It is a compulsory language for all those people who communicate technically at any level and want to convert their work into a creating activity. It contributes effectively to communicating ideas at any stage of their development; in sketch phase, it is an ideal instrument to developing, through the confrontation of opinions, investigation projects or design proposals.

Course Objectives

The main purpose of this course is to fulfill the need and requirement of drawings for civil Engineering projects. General nature of drawings, components, symbols, and nomenclature needed for specific drawings such as architectural, structural, plumbing, electrical, air-conditioning, roads and earth work etc. Drawings at different stages of projects, Elements of perspective drawing.

Learning outcomes

Upon successful completion of the course, the student will be able to:

1. Acquire the basic knowledge of civil engineering drawing skills.
2. Apply the concepts of civil engineering drawing techniques.
3. Demonstrate individually the drawings of plan, elevation, and cross sections of building parts.

Course Contents:

Constructional Engineering Drawing: General description of drawings related to civil Engineering projects

Unit1. Building Drawing:

Elements of architectural planning and design, conceptual, schematic and working drawings and details of residential, commercial, religious, recreational, industrial, clinical, hospital, and educational buildings,

Unit2. Doors

windows, staircases

Unit3. Elements of structural drawing and detailing

Preparation of foundation plan, structural framing, slab details, staircase details, water tanks, beam and column elevations and sections mostly pertaining to reinforced concrete structures.

Unit4. Steel roof truss, connection details and fabrication drawings Plumbing and electrical detailing pertaining to small residential units.

Unit5. Computer Aided Drafting:

General and basic know how related to computer aided drafting, e.g. co-ordinate system, drawings setup procedure, basic draw commands, basic edit commands, Layers, creating text and defining styles options, block and drawing

Civil Engineering Drawing (Lab)

1. Introduction to Civil Engineering Drawing, I. S. specification for preparation of drawings, Use of drawing instruments and materials, Basic Tools, Lines: Types, configuration and application, Selection of line thickness,

2. Lettering, Numbering and Dimensioning Vertical and inclined single stroke letters, Lettering types and rules, Dimension lines, projection lines, leaders or pointer lines, Arrow heads, Dimensioning,

3. Geometric Construction Drawing simple geometric objects (polygon, pentagon and hexagons etc).

4. Orthographic Projections of different Solids I-beam etc.

5. Orthographic Projections of Civil Engineering drawing.

- **Teaching-learning Strategies**
  Besides the formal introductory lectures on the topics mentioned above each graduate student will complete assignment related to graphic representation of civil engineering objects.
  Assignments
  Assignments will be given with a combination of mini tasks, projects, and presentations related to mechanical engineering.

  - Select a building and study its operation and structural detail.

- Draw the 3D model of the building and draw 2D drawings.

- **Assessment and Examinations**

  Daily Drawings/Lab Work/Daily Quizzes to assure comprehension of drafting skills. Three to Four Major assignments of Drawings covering individual topics Civil Project Detail of marks is given below.

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Textbook

1. Madsen, D. P., & Shumaker, T. M. (2017). *Civil drafting technology*. Pearson.

Recommend Readings

1. Schraidt, F(1995). Geometrical Drawing. A Collection of Plates for Practical Use in Elementary Mechanical Drawing. London: Thames and Hudson.
2. Giesecke, F. E., Mitchell, A., Spencer, H., Hill, I., Dygdon, J., & Novak, J. *Technical drawing with engineering graphics*. Prentice HallAitkin, M. J. (1990)., London: Longman.

Course Title: **Industrial/Mechanical Drawing**

Course Code: MCTE-403-ED

Semester: VII

Type: Specialization Course
Credit Hours: 3+1
Pre-requisites: Technical and Geometrical Drawing

Knowledge of basic computer operations and file management. • Basic understanding of general drafting practices using both traditional hand delineation tools and computer-aided delineation (CAD).

Course Description

This subject is established to carry out the electrical basic skills in the use of drawing tools and to enable the students to prepare Orthographic, pictorial, free hand sketching for electrical drawings. Students will learn how to take a design sketch and turn it into a electrical drawing that can be used to make a part that could be used to build an addition on a house.

Course Objectives

The main purpose of this course is to be able to draw machine elements and wiring diagram using the CAD software and fulfill the need and requirement of drawings for electrical Engineering projects. General nature of drawings, components, symbols, and nomenclature needed for specific drawings such as electrical, air-conditioning etc. Drawings at different stages of projects, Elements of perspective drawing.

Learning outcomes

Upon the successful completion of this course, the student will be able to:

• Define and apply major concepts of the design process related to electrical drawing.

• Demonstrate competency in the sketching, technical writing, and formal presentations.

• To be able to draw machine elements and wiring diagram using the CAD software

• Identify major areas of growth within the electrical field.

• Apply major concepts from the history of electrical drawing.

• To be able to analyze and design of electrical circuits or electronic circuits using circuit simulation software.

Course Contents:

Unit1. USES AND APPLICATION OF TECHNICAL DRAWING

1.1 Importance of Technical drawing and Techniques/Engineer's language.

1.2 Uses of technical drawing

1.3 tools and equipment

Unit2. DRAWING TOOLS AND MATERIALS

2.1 Classification of drawing pencils

2.2 Types of drawing papers and sizes

2.3 Drawing instruments and uses.

2.4 Types and use of erasers.

2.5 Care & maintenance of drawing tools

Unit 3. BASIC DIMENSIONING

3.1 Definition of dimensioning.

3.2 Two types of dimensioning.

3.3 Elements in dimensioning.

3.4 Dimensioning pictorials.

3.5 Dimensioning Multi Views.

3.6 Dimensioning Holes and arcs.

3.7 Dimensioning Angles.

Unit 4. MULTI VIEW DRAWING/ORTHOGRAPHIC DRAWING

4.1 Definition and concept.

4.2 Six principal views.

4.3 Visualization glass box technique.

4.4 Principal planes of projections.

4.5 Projection lines.

4.6 Arrangement of views.

4.7 Multi view drawing, 1st angle and 3rd angle projection of simple objects.

Unit5. INTRODUCTION TO PICTORIAL DRAWING

5.1 Three types of pictorials

5.2 Uses of pictorial views.

5.3 Isometric sketching of Rectangular Block and simple objects.

5.4 Oblique sketching of rectangular block and simple objects.

5.5 Proportions in pictorial drawing.

Unit6. SYMBOLS

6.1 Building Material symbols.

6.2 Metal symbols.

6.3 Electrical symbols.

6.4 Importance and uses.

Unit7. ELECTRICAL DRAWING

7.1 Drawing wiring circuits.

7.1.1 Single line diagram.

7.1.2 Wiring diagram.

7.1.3 Layout diagram.

7.1.4 Schematic diagram.

7.1.5 Circuit diagram.

Unit 8. LINE SKETCHING

8.1 Introduction to sketching techniques.

8.2 Sketching Horizontal, vertical, inclined lines.

8.3 Sketching of parallel (Horizontal, vertical, inclined lines).

8.4 Sketching arcs and circles.

8.5 Sketching squares, Rectangles, ellipses and simple objects.

8.6 Proportion in sketching.

LIST OF PRACTICALS

1. Prepare the title block.

2. Draw the different lines according to rules (Horizontal and vertical lines) etc.

3. Draw square, rectangle, triangles, circle, hexagon, ellipse (at least 3 sheets).

4. Practice of lettering and dimensioning.

5. Draw first and third angle drawing of single parts, i.e., prism, stepped block, V-block, gland etc.

6. Draw isometric projection and oblique projection of rectangular prism, stepped block, v-block,

7. Draw the surface development of prism, cylinder, cone, square, pyramid (at least 3 sheets).

8. Draw the section diagram of a bolt and nuts.

9. Draw building materials, metals, and electrical symbols.

10. Draw the single line diagram of a grid-station switchyard.

11. Draw the wiring circuit diagram of house wiring and house wiring layout

12. Wiring diagram of a single-phase motor with starter.

13. Circuit diagram of 3-phase motor with magnetic contractor and star delta starters.

14. Draw layout of earthing for a simple house (Earth Wire, Earth lead, Earthing Electrode).

15. Draw layout of earthing circuit for a shop or a factory.

16. Draw Single line power wiring diagram of a shop of a factory.

17. Draw single line power wiring of power lab of a technical college.

18. Schematic diagram of power control panel of power lab of a technical college.

19. Study Drawing of a multi room house with electrical wiring.

20. Sketch insulators.

21. Draw a commutator.

22. Draw schematic diagram of a power supply/powerhouse.

- **Teaching-learning Strategies**
  Besides the formal introductory lectures on the topics mentioned above each graduate student will complete assignment related to graphic representation of electrical engineering objects.
  Assignments
  Students will prepare drawing sheets related to electrical engineering drawing mentioned in list of practical.
- **Assessment and Examinations**
  Daily Drawings/Lab Work/Daily Quizzes to assure comprehension of drawing skills. Twenty assignments of Drawings covering individual electrical drawing projects. Break-up of marks is given below.

Sr. No.	Elements	Weightage	Details

1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Textbook

- Heine, G. M., & Dunlap, C. H. (1942). How to read electrical blueprints.

Recommend Readings

- Rosenberg, P., & Palmquist, R. E. (2004). *Audel House Wiring*. John Wiley & Sons.
- Oldfield, R. L. (1960). *Radio-television & basic electronics*. American Technical Society.
- Rosenberg, P., & Middleton, R. G. (2004). *Audel practical electricity* (Vol. 19). John Wiley & Sons.
- Gilberg, T. E., & Learning, C. TEXTBOOKS. *JAWAHARLAL NEHRU UNIVERSITY ANANTAPUR ANANTAPUR–515 002 (AP) INDIA*, 52.
- N. Oohira et.al, Electrical drawing (1st Edition), Jikkyou Shuppan Co., Ltd, 2015

Course Title: **Freehand and Architectural Drawing**

Course Code: MCTE-404-ED

Type: Specialization Course

Credit Hours: 3

Pre-requisites: Technical and Geometrical Drawing

Knowledge of basic computer operations and file management. • Basic understanding of general drafting practices using both traditional hand delineation tools and computer-aided delineation (CAD).

Course Description

This general course outline follows the chapters that are presented in the text. The syllabus can assist in the planning and set-up of a course about architectural drafting and design. The chapter-based outlines should be converted into a schedule that can be followed by the student and instructor. The time estimates provided in this syllabus are estimates and should be modified accordingly. The instructor should remember that it is not considered good pedagogy if the entire text is covered yet the students only receive a nominal content and skill development during the course.

Course Objectives

This course is designed to introduce the student to the concepts, practices, standards, and drafting techniques needed for architectural design. Most of the book is written for residential construction with the final four chapters dedicated to commercial design. Students learn both the content and skills necessary to become a proficient drafter in the field of architecture.

Learning outcomes

Upon the successful completion of this course, the student will be able to:

- Define and apply major concepts of the design process related to architectural drafting.
- Demonstrate competency in the sketching, technical writing, and formal presentations.
- Demonstrate competency in the use of CAD software.
- Identify major areas of growth within the architecture field.
- Apply major concepts from the history of architecture.
- Demonstrate knowledge of blueprint development and construction documents.
- Demonstrate ability to modify current structure based on new set of construction methods.

- Demonstrate the ability to use dimensions correctly.

Course Contents:

Unit 1. CADD Introduction

1.1 AutoCAD Program

1.2 Isometrics and Orthographic

1.3 Drawing Symbols

Unit 2. Document Reading

2.1 Scale Reading

2.2 Sketching

2.3 AutoCAD sketching

Unit 3. Blueprint Development

Building Layouts and Renovations

3.2 Elevations and Schedules

3.3 Blueprints to Models

Unit 4. Blueprint Details

4.1 Design and Development 4.2 Specialty Plans

4.3 Safety and Code

Unit 5. Commercial Development

5.1 Building Types

5.2 Specialty Plans

5.3 Topography

Unit 6. Urban Planning

6.1 Urban Layouts

6.2 Urban Site Development

Architectural Engineering Drawing (Lab)

1. Introduction to architectural Engineering Drawing, I. S. specification for preparation of drawings, Use of drawing instruments and materials, Basic Tools, Lines: Types, configuration and application, Selection of line thickness,

2. Lettering, Numbering and Dimensioning Vertical and inclined single stroke letters, Lettering types and rules, Dimension lines, projection lines, leaders or pointer lines, Arrow heads, Dimensioning,

3. Geometric Construction Drawing simple geometric objects (polygon, pentagon and hexagons etc).

4. Orthographic Projections of different Solids I-beam etc.

5. Orthographic Projections of Architectural Engineering drawing.

Practical

- Select a Project and study its architectural detail.
- Draw the 3D model of the building and draw 2D drawings.

- **Teaching-learning Strategies**
  Besides the formal introductory lectures on the topics mentioned above each graduate student will complete assignment related to graphic representation of architectural engineering objects.
  Assignments
  Assignments will be given with a combination of mini tasks, projects, and presentations related to architectural engineering drawing.
  Assessment and Examinations
  Daily Drawings/Lab Work/Daily Quizzes to assure comprehension of drafting skills. Three to Four Major assignments of Drawings covering individual Architectural Project Detail is given below.

Sr. No.	Elements	Weightage	Details
1	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Textbook

- Leavitt, A. J. (2014). *The Vo-Tech Track to Success in Architecture and Construction*. The Rosen Publishing Group, Inc.

Recommend Readings

- Mrema, G. C., Gumbe, L. O., Chepete, H. J., & Agullo, J. O. (2012). *Rural structures in the tropics: design and development*. Food and Agriculture Organization of the United Nations.
- Giesecke, F. E., Mitchell, A., Spencer, H., Hill, I., Dygdon, J., & Novak, J.*Technical drawing with engineering graphics*. Prentice HallAitkin, M. J. (1990)., London: Longman.

b. Electricity (Area of Specialization)

COURSE TITLE: ELECTRICAL WIRING

Course Code: MCTE-401-EL

Course Description:

The course is aimed at providing skill in the use of tools and machines of common usage, to enable the student to develop simple projects related to wiring. Related safety concerns while working on the job, forms an integrated part of the course. Necessary information about the types, materials, tools/machines may be provided as shoptalk. However, for wiring, separate theory classes will provide the essential background knowledge of electrical rules and regulations.

- Semester: VII
- Credit Hours: 3
- Pre-requisites course requirements/ skills NA

Unit 1

1. UNDERSTAND ABOUT THE TYPES & SIZES OF COMMON CABLES USED IN DOMESTIC WIRING.

1.1 Classify cables with respect to insulation, core, voltage grade & current carrying capacity.

1.2 Explain different systems for calculation of cable size.

1.3 Calculate size of cable for a given load

2. UNDERSTAND THE WIRING SYSTEMS (PVC CONDUIT, CHANNEL AND CABLE WIRING).

2.1 Distinguish between different wiring systems

2.2 Name of necessary materials required for each type of wiring.

2.3 Explain the uses of each type of wiring.

3. UNDERSTAND THE NEED FOR PROTECTION OF HOUSE WIRING AND KNOW DIFFERENT PROTECTIVE DEVICES FOR HOUSE WIRING.

3.1 Define fuse, miniature circuit breaker.

3.2 Distinguish between fuse and miniature circuit breaker.

3.3 List the parts of fuse & M.C.B.

3.4 Compare the advantages & disadvantages of fuse & M.C.B.

4. UNDERSTAND THE EARTHING SYSTEM USED IN HOUSE WIRING.

4.1 Name components of earthing system.

4.2 Define earth electrode, earth continuity conductor & earthing lead.

4.3 Draw the earthing circuit.

4.4 Explain the earth fault current.

4.5 Calculate size of earth continuity conductor, earthing lead & earth electrodes.

4.6 Draw scheme of earthing system.

5. UNDERSTAND THE CONSTRUCTION, NEED & APPLICATION OF DISTRIBUTION BOARDS.

5.1 Define distribution board.

5.2 Types of D.B. w.r.t. size, current rating, voltage, No. of C. Bs and phases etc.

5.3 Name/Label parts of distribution board.

5.4 Prepare the distribution board.

6. UNDERSTAND THE WIRING TESTS & TEST INSTRUMENT (CONTINUITY TESTERS, TEST LAMP, MEGGER).

6.1 Name different wiring tests.

6.2 Explain the procedure of test.

6.3 Enlist the results of test.

7. KNOW ABOUT THE WIRING ACCESSORIES (SWITCHES, SOCKET OUTLETS, CEILING ROSE, LAMP HOLDERS ETC).

7.1 Enlist wiring accessories

7.2 State purpose of each accessory.

7.3 Connect accessories according to the circuit diagram.

8. UNDERSTAND THE PROCEDURE OF JOINTING AND SOLDERING - MAKE A JOINT AND SOLDER IT.

8.1 Make the cable joints (Britannia, straight, Tee) on single core single strand, single core multistrand and multicore cables

8.2 Solder the joint.

8.3 Describe the correct procedure of jointing & soldering.

8.4 Explain the composition of solder and soldering flux.

9. UNDERSTAND THE LIGHTING CIRCUITS - CONNECT DIFFERENT CIRCUITS.

9.1 Connect one lamp with one way switch

9.2 Connect staircase circuit.

9.3 Connect lamps in series and parallel with switches.

9.4 Label parts of fluorescent lamp (e.g. choke and starter) and its circuit.

9.5 Connect fluorescent lamp in different fashions.

9.6 Draw the circuit diagram of each circuit.

9.7 Discuss to read the wiring diagrams, layout diagram and current path diagram.

10. INSTALL A DOMESTIC WIRING (CHANNEL WIRING & P.V.C AND STEEL, CLEAT , BATTEN, CASING, CAPPING,CONDUIT WIRING, CABLE WIRING).

10.1 Select the material for wiring.

10.2 Design the layout.

10.3 Draw the circuit.

10.4 Select the tools.

10.5 Install the wiring.

10.6 Test the wiring.

10.7 Commission the wiring.

10.8 Locate & rectify the faults.

11. CONSTRUCT ELECTRICIAN TEST BOARD & SWITCH BOARD.

11.1 Select material & accessories.

11.2 Fix the accessories on board according to the circuit diagram.

11.3 Connect the accessories.

11.4 Test the function of circuit.

INDUSTRIAL & COMMERCIAL WIRING

1. UNDERSTAND POWER WIRING SYSTEMS (STEEL CONDUIT, TRUNKING & DUCTING, CATENARY, OVERHEAD BUSBAR, TOUGH SHEATHED

SYSTEM).

1.1 Describe procedure of each wiring system.

1.2 Identify the material used in each wiring.

1.3 Explain the uses of each of the wiring systems.

2. **UNDERSTAND L.T POWER CABLES - KNOW SPECIAL PURPOSE CABLES (HEAT RESISTANT, FIRE RETARDING, WELDING CABLES).**

2.1 Describe the construction of different types of L.T. power cables.

2.2 State the uses of special purpose cables.

2.3 Designate sizes of cables.

2.4 Give specifications of cables.

3. UNDERSTAND MULTISTORY DISTRIBUTION SYSTEM.

3.1 Describe electrical distribution system in multistory buildings.

3.2 Illustrate a typical distribution system in a multistory building.

3.3 Draw the wiring diagram of multistory building.

4. APPLY THE TECHNIQUES OF JOINTING POWER CABLES.

4.1 Identify the jointing tools.

4.2 Differentiate jointing material for copper conductors & aluminums conductors.

4.3 Narrate jointing technique & procedure for jointing copper & aluminum.

conductor power cables.

5. ACQUIRE THE SKILL IN INSTALLING POWER WIRING.

5.1 Install steel conduit wiring.

5.2 Install P.V.C.conduit wiring.

5.3 Install motor with D.O.L, 3 point & star-Delta starter.

5.4 Dismantle & assemble I-ph and 3-ph motors.

5.5 Construct & level motor foundation.

5.6 Locate & rectify faults in power wiring.

Unit 2 SAFETY AND REGULATION:

1. UNDERSTAND THE HAZARDS TO LIFE AND EQUIPMENT FROM

ELECTRICITY, ELECTRICAL & RELATED EQUIPMENTS - UNDERSTAND PRECAUTIONS WITH PREVENTIVE METHODS.

1.1 State hazards to life from electric rotating machines.

1.2 Explain preventive methods.

1.3 Describe fire and its types.

1.4 Describe firefighting equipment's.

1.5 Describe the principles of firefighting.

2. UNDERSTAND I.E.E. REGULATION FOR ELECTRICAL EQUIPMENTS OF BUILDING AND ELECTRICITY RULES OF PAKISTAN, FACTORY COMPENSATION ACT.

1.1 Define the following I.E.E. regulations (A1,A3,A-26,B-4,B-

12, B-23, C-4,C-1,C-8, D-1,D-20)

1.2 Explain the regulations (relevant) electricity

1.3 Explain rules of Pakistan (R.No's 25, 28, 29, 32, 40, 49,

51, 52, 58, 60, 62, 64)

1.4 Describe Factory act (compensation only)

3. UNDERSTAND THE PROCEDURE FOR CLAIMING COMPENSATION FOR WORKERS AFFECTED DUE TO ACCIDENT.

3.1 Prepare report of fatal accidents on the relevant forms for the concerned authorities.

3.2 State the procedure for medical examination of the personnel affected due to accidents.

3.3 Describe the procedure for reporting injuries and acquired diseases due to nature of work.

3.4 Describe the method and amount of compensation payable to workmen due to accidents.

LIST OF PRACTICALS (ELECTRICAL WIRING)

1. To study wiring accessories.

2. To study tools used in wiring.

3. To study types of cables.

4. Demonstration of treatment against electric shock.

5. To control one lamp with a single way switch.

6. To control Two lamps individually by 1-way switches.

7. To control Three lamps individually by 3 one-way switches & install a fuse.

8. To control Two lamps individually by 2-way switch.

9. To control One lamp from 2 different places. (Staircase circuit).

10. To control One lamp from 3 different places.

11. To control Three lamps in series and measure voltage drop across each lamp.

12. To construct a test board.

13. To construct fuse indication circuit.

14. To control Two lamps by two 2-way switches both in series, both in parallel and individual control.

15. To control a bell through indicator by push button.

16. To prepare Bell-indicator circuit (Hoteling circuit).

17. To prepare Go down circuit.

18. Study of wiring boxes and sealing.

19. To prepare single twist joint.

20. To prepare married joint.

21. To prepare duplex joint.

22. To prepare rat-tail joint.

23. To prepare a Britannia joint.

24. Study of low power cables.

25. Study of medium power cables.

26. Jointing of low voltage cables.

27. Jointing of medium voltage cables.

28. Jointing of paper cables.

29. To prepare wiring switch board with 4 switches, one fan regulator, one socket and a lamp.

30. Study of various protective devices

PROJECT: (ELECTRICAL WIRING)

- Two room house wiring in P.V.C. conduit.

- Batten wiring for four rooms.

- Making motor foundation and its leveling.

Note: Students must prepare theory and practical notebooks and got it checked weekly by the Concerned teacher. They should produce these to external examiner for sessional work/marking check up at the time of final exam

GUIDELINES FOR CONDUCT OF PRACTICALS

Following guidelines are suggested for the teachers before/while conducting or supervising lab/shop activities.

The teacher should:

1 Draw project circuit diagrams and explain the main concept(s).

2 Demonstrate/identify safety precautions to be taken while conducting practical's.

3 Discuss the procedure for the conduct of exercise by the students.

4 Identify key points to be specially observed/noted by the students while conducting the experiment.

5 Help students select tools, equipment, and other material for the practical specially in the context of ratings & sizes.

6 Guide students in drawing conclusion/results.

7 Arrange a general discussion session at the end of practical to summarize the experiment.

8. Try to ensure and inculcate safety habits in the students

BOOKS RECOMMENDED:

1. Narvas, M. F., & Prasetyo, Y. T. (2021, April). Postural & Hand Ergonomics Assessments in Wiring High Voltage Control & Protection Panels. In *2021 IEEE 8th International Conference on Industrial Engineering and Applications (ICIEA)* (pp. 101-105). IEEE.

2. Electrical Wiring-A.I.O.U Islamabad.

3Furse, C., & Haupt, R. (2001). Down to the wire [aircraft wiring]. *IEEE spectrum*, *38*(2), 34-39.

4. El. Wiring Guide by Audels.

5. Jamil, F., & Ahmad, E. (2014). An empirical study of electricity theft from electricity distribution companies in Pakistan. *The Pakistan Development Review*, 239-254.

Title of Course: ELECTRICAL WINDING

Course Code: MCTE-402-EL

Course Description

The course is designed to understand electricity involves the sound familiarity with the established laws and Concepts, and their application in different situations. Thus, solving problems also forms Part of the cognition of these concepts. This course aims at providing a strong foundation in these basic concepts and laws of electricity, along with an appreciation of the magnitudes of the quantities involved or to be guessed, through solving numerical problems. The concepts are further strengthened through extensive Laboratory work.

- **Semester: VII**
- **Credit Hours: 3**
- **Completion of Basic Electricity course**

Course Objectives

The course objectives are:

1. Impart a basic knowledge of electrical quantities such as current, voltage, power, energy and Frequency to understand the impact of technology in a global and societal context.
1. Provide working knowledge for the analysis of basic DC and AC circuits used in electrical and electronic devices.
2. To explain the working principle, construction, applications of DC machines, AC machines & measuring instruments.
3. Highlight the importance of transformers in transmission and distribution of electric power.

Learning Outcome

On completion of the course students will be able to

1. Predict the behavior of any electrical and magnetic circuits.
2. Formulate and solve complex AC, Dc circuits.
3. Identify the type of electrical machine used for that application.
4. Realize the requirement of transformers in transmission and distribution of electric power and other applications.
5. Function on multi-disciplinary teams

COURSE CONTENTS

UNIT-I D.C. FUNDAMENTAL

ELECTRIC CURRENT AND OHM'S LAW

1. UNDERSTAND BASIC CONCEPTS OF ELECTRICITY

1.1 Electricity history.

1.2 Compare conductor, Insulator & semi-conductor.

1.3 Define Resistance, conductance, and state units.

1.4 Define electrical current and state its unit.

1.5 Define potential difference and state its unit.

1.6 State Ohm`s law.

1.7 Define series and parallel circuits with their properties.

1.8 Determine total resistances in series & parallel circuits.

1.9 Calculate division of voltage in series circuits.

1.10 Calculate division of current in parallel circuits.

2. UNDERSTAND KIRCHHOFF'S LAWS

2.1 State Kirchhoff`s 1st Law - (current Law).

2.2 State Kirchhoff`s 2nd Law - (voltage Law).

3. UNDERSTAND WORK, POWER & ENERGY

3.1 Define work, electrical power, mechanical power, and energy with their units.

3.2 State formula for conversion of Electrical Energy to Mechanical Energy.

4. UNDERSTAND MAGNETIC EFFECTS OF ELECTRIC CURRENT

4.1 Explain Laws of Magnetic force.

4.2 Describe Magnetic field of a straight current carrying conductor.

4.3 Determine Magnetic field of a coil.

4.4 State cork-screw rule.

4.5 Describe effect of iron core in a coil.

5. UNDERSTAND ELECTROMAGNETIC INDUCTION

5.1 State Faraday's Laws of Electromagnetic Induction.

5.2 Define dynamically & statically induced E.M.F

5.3 Explain Lenz's Law

5.4 Explain self & Mutual Inductances.

6. UNDERSTAND FUNDAMENTALS OF ELECTROSTATICS

6.1 Define the term static-electricity.

6.2 Explain the term capacitance.

6.3 List types of capacitors.

6.4 Explain charging & discharging of capacitors.

UNIT-II A.C. FUNDAMENTALS.

7. UNDERSTAND A.C. FUNDAMENTALS

7.1 Define alternating current & voltage.

7.2 Describe principle of working of A.C. Generator.

7.3 Explain simple loop Alternator & relationship between speed, poles, and frequency.

8 UNDERSTAND CONSTRUCTION & PRINCIPLE OF TRANSFORMER.

8.1 Define transformer as step up and step down.

8.2 Describe parts of transformer.

8.3 Explain principle of transformer.

8.4 a) Describe classification of transformer.

b) Differentiate core type & shell type transformer.

9 WORKING OF 1 PHASE INDUCTION MOTOR.

9.1 State the types of 1 phase Induction motor

9.2 Explain principle of working of split phase, capacitor & shaded pole motor

9.3 Explain the principle of repulsion motor, A.C series motor, and universal motor.

10 UNDERSTAND PRINCIPLE, TYPES AND USES OF DIGITAL METERS

10.1 Explain working principle (Block diagram)

10.2 Explain types in lab use (Voltmeter, Ammeter, and Ohmmeter, AVO meter, watt meter (single phase & three phase), Energy meter (single phase & three phase) and frequency meter).

11 UNDERSTAND WORKING PRINCIPLE OF OSCILLOSCOPE

11.1 Explain working of Oscilloscope tube

11.2 Enlist parts of Oscilloscope

11.3 Explain applications for finding wave shape and frequency.

LIST OF PRACTICALS

Note: Students should demonstrate concern for personal and equipment safety while working in Electrical Labs

1. Study of simple Electrical Instruments (Ammeter, Voltmeter etc.
2. Determination of the resistances of
   a) Sliding Rheostat.
   b) Voltmeter.
   c) Incandescent lamp.
3. Determination of resistance of a wire by micrometer.
4. Determination of temperature co-efficient of copper by ammeter-voltmeter methods.
5. Verification of ohm's law.
6. Verification of laws of combination of resistances.
7. Study of various types of resistors and determination of resistance by color coding.
8. Measurement of power by Voltmeter-ammeter method and watt meter.
9. Study of connections of thermal relay.
10. Measurement of energy-by-energy meter.
11. Verification of Kirchhoff's Laws.
12. Determination of the efficiency of an electric Kettle.
13. Make an electromagnet.
14. Study of the force on a current-carrying conductor in magnetic field.
15. Verification of Faraday's laws of electromagnet induction.
16. Study of Generator and Transformer.
17. Study the production of e.m.f in coupled coils by changing current in one coil.
18. Problem solving session.
19. Study of self-induction of a coil and effect of introducing iron core in it.
20. Study of various types of capacitors and Inductors.
21. Determination of the capacity of capacitors by color coding.
22. Verification of the laws of the combination of capacitors.
23. Determination of breakdown voltage of a low-voltage capacitor.

24. Test week: Every student should be given independent different practical, and teacher should count its performance towards sessional marks.

25. Study of C.R.O. and measurement of sine wave.

26. Determination of average and R.M.S values and sine wave (on graph paper)

27. Determination of inductance of a choke coil using ammeter and voltmeter method.

28. Determination of impedance of a resistive-inductive series circuit.

29. Study of phase displacement by C.R.O.

30. Determination of power consumed by a fan/choke by 3-ammeter method.

31. Vector Diagrams practice.

32. Determination of power-factor of a single-phase circuit using voltmeter, ammeter and Each student must conduct one practical for evaluation for final test.

** Students must prepare theory and practical notebooks and get it checked weekly by the concerned teacher. He should produce it to external examiner for sessional work/marking check up at the time of final exam.

Assessment and Examinations

Assessment will be done as per university/department policy.

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Books Recommended:

1. Gelder, K. (Ed.). (2000). *The horror reader*. Psychology Press.
2. Dawes, C. L. (1934). Encouraging initiative in the engineering student. *Electrical Engineering*, *53*(10), 1416-1418.
3. Tu, H., Yang, Y., Zhang, L., Xie, D., Lyu, X., Song, L., ... & Sun, J. (2018). A modified admiralty coefficient for estimating power curves in EEDI calculations. *Ocean Engineering*, *150*, 309-317.
4. Theraja, B. L., & Theraja, A. K. (2006). Electrical Technology S. *Chand & company Ltd Ram Nagar, New Delhi 24th Edition Pp2416-2421*.
5. Kuznetsov, M., Vershinin, O., Tyrtyshnyy, V., & Antipov, O. (2014). Low-threshold mode instability in Yb 3+-doped few-mode fiber amplifiers. *Optics express*, *22*(24), 29714-29725.

Title of Course: Electrical Generation & Transmission

Course Code: MCTE-403-EL

Course Description

Power Generation is an essential area of electrical technology. Familiarization of the types, construction, working, and operation of different types of power plants is aimed at. The student should be able to see the power station as a unit, with the need and working of each component integrated into the unit.

An area of growing concern covered in the energy conservation, as also an introduction to the economic aspects of electricity supply as an Industry, showing concern for investments and returns.

- Semester: VIII
- Credit Hours: 3+!
- Pre-requisites course requirements/ skills NA

Course Objectives

1. To under the concepts of various methods Electrical Energy Generation.

2. To learn the usage of passive elements in various Power Transmission Systems.

3. To understand the factors affecting Insulators and Under Ground cables.

4. To calculate the various parameters in the Distribution System.

5. To learn critical mathematical calculations that are common to any overhead line design. Calculations such as transverse loading, conductor clearances, pole buckling, and guying will be discussed in detail.

6. Suggest methods for power factor improvement.

7. To design a Transmission and distribution electric power system

Course Outcomes:

At the end of the course the student would be able to:

1. Analyze the performance of various Units involved in the power plants.

2. Apply power system fundamentals to the design of a system that meets specific needs.

3. Design a power system solution based on the problem requirements and realistic Constraints.

4. Develop a major design experience in power a system that prepares them for

engineering practice.

COURSE CONTENTS

UNIT-I

1. KNOW DIFFERENT SOURCES OF ELECTRICAL POWER.

1.1 Name different sources of power, (thermal, hydel, nuclear, solar, tidal, magnetohydrodynamic, wind)

1.2 State sources of power as Renewable and Exhaustible

1.3 State merits and demerits of each source (installation & working w.r.t. economics

1.4 State characteristics of each category of sources: Power sensitivity, environmental effects, life and life cycle, cost, technology.

1.5 State the power generation as an energy conversion process, starting from the available source.

2. UNDERSTAND THE TYPES AND WORKING COMPONENTS OF THERMAL POWER STATIONS.

2.1 List types of fuel used in thermal powerhouse (Coal, Oil, Gas).

2.2 State requirements of site selection (cost of land, availability of abundant water, transport, load control location, climate, pollution) indicating relative weightages.

2.3 Enlist the types of the thermal power station.

2.4 Explain the working of a power plant showing parts/components on a block-diagram integrating into a unit (station)

2.5 Explain the parts of the thermal power plant.

2.6 State types of boilers water tube, fire tube.

2.7 Describe steam turbine (Reaction, impulse).

2.8 Explain the construction and working of a steam turbine.

2.9 Explain types of steam turbines.

2.10 Describe the method of determining the capacity of a steam turbine.

2.11 Describe the construction of a turbo generator.

2.12 Explain the function and application of a condenser in a steam turbine.

2.13 Draw layout of water circulation system in steam power station

2.14 Describe diesel engine power station.

2.15 Compare two-stroke and four-stroke diesel engines.

2.16 Explain a diesel power station with the help of a block- diagram.

2.17 Show schematic diagram of the diesel power station.

3. UNDERSTAND THE CONSTRUCTION AND WORKING OF A NUCLEAR POWER STATION.

3.1 Enlist the main parts of a nuclear power station.

3.2 Write working principle of nuclear energy in context with atomic structure, atomic number, the mass number for materials used for nuclear energy.

3.3 Define kinetic energy, isotope, nuclear fuel.

3.4 Describe fusion and fission.

3.5 State importance of heavy water (H3O).

3.6 Enlist the fissionable and fertile fuels.

3.7 List types of nuclear reactors.

3.8 Describe the construction and working of a thermal Reactor.

3.9 Explain the working of a Nuclear Station with the help of a line diagram of a nuclear power plant.

3.10 Describe salient features of nuclear power stations working in Pakistan.

4. UNDERSTAND THE TYPES, WORKING, AND COMPONENTS OF HYDEL POWER STATION.

4.1 Enlist types of the hydroelectric power station (head of water, demand of load & quantity of water)

4.2 Enlist merits and demerits of the hydel power station.

4.3 Describe Hydel Power Stations.

4.4 Explain requirements of site selection for the installation of the hydel power plant.

4.5 Explain general arrangements and operation of hydel power station.

4.6 Describe types of hydel turbines and their characteristics.

4.7 Compare different hydel turbines.

4.8 State function of turbine components.

4.9 Name hydroelectric power plants working in Pakistan along with their capacities.

5. UNDERSTAND THE WORKING AND USES OF GAS TURBINES.

5.1 Enlist advantages and disadvantages of Gas turbine stations.

5.2 Describe gas turbine (construction and working).

5.3 Sketch block diagram of a gas turbine power station.

5.4 List gas turbine power stations working in Pakistan.

5.5 Describe combined cycle power station.

5.6 Explain the combined cycle power station working in Pakistan.

5.7 Describe the environmental effects of gas turbine stations and measures to improve the situation.

6 UNDERSTAND DIFFERENT ELEMENTS AND TYPES OF TRANSMISSION SYSTEMS.

6.1 Explain how transmission systems are classified concerning different factors.

6.2 Explain the need for transmission and distribution lines.

6.3 Explain both supply systems (A.C. and D.C.)

6.4 Compare supply systems with their relative advantages and disadvantages.

6.5 Compare overhead and underground transmission systems concerning cost ease of maintenance and installation etc.

6.6 Explain effects of following on transmission line performance:

a) Supply frequency.

b) Supply voltages

c) No of conductors.

d) Power factor.

6.7 Explain the effects of low power factors in the industry and on the performance of transmission lines.

6.8 Choose the correct method of improving P.F.

6.9 Solve problems on power factor improvement.

7. UNDERSTAND THE CONSTANTS AND EFFECTS OF TRANSMISSION LINES.

7.1 State & Explain constants of transmission lines.

7.3 Explain the effect of the charging current on transmission lines.

7.4 Explain the voltage drop in High Voltage transmission lines.

7.5 Solve problems on voltage drop in short transmission lines.

7.6 Define effects on transmission lines.

(a) Ferranti effect.

(b) Skin effect.

(c) Corona effect.

7.7 Explain Kelvin's Economy Law of feeders.

8. UNDERSTAND THE TYPES AND USES OF INSULATORS USED IN TRANSMISSION & DISTRIBUTION LINES.

8.1 Explain various insulators used in overhead high voltage transmission lines.

8.2 State uses of each type.

8.3 Explain various insulators used in medium and low voltage transmission/distribution lines.

8.4 Select proper insulators for given systems.

9. UNDERSTAND OVER-HEADLINE CONDUCTORS.

9.1 Name the conductors used in over-headlines.

9.2 Compare various transmission line conductors.

9.3 Select the most useful conductor for given situation.

9.4 State the merits and demerits of different conductor materials.

10. UNDERSTAND THE TYPES, COMPONENTS, AND SYSTEMS OF SUB-STATIONS.

10.1 Explain the types of substations,
(a) Step up a substation,
(b) Primary Grid substation,
(c) Secondary substation,
(d) Distributor substations.
10.2 Explain the merits of indoor and outdoor substations.
10.3 Enlist the equipment installed at a substation.
10.4 Explain the necessity of various Bus Bar arrangements.
(a) Single Bus Bar.
(b) Double Bus Bar.
(c) Sectionizing Bus Bar.
10.9 Explain the advantages of interconnected power stations.
10.10 Draw the line diagram of Pakistan National Grid System of 500 KV, 220 KV, 132 KV.
Visit and Prepare Report

- Large grid station for general study. Powerhouse.

- Enlist the equipment with KV rating & power cables used in the above installations.

- Draw the drawings of Insulators & Poles used in above installation Industrial power plant (Diesel set), Industrial scheme of distribution of a factory with at least the load of 200 KVA capacity on drawing sheets. Enlist all Electrical equipment installed there.

- Also note the power factor improving methods used by the industries visited.

- **Assessment and Examinations**
  Assessment will be done as per university/department policy.

TEXTBOOKS

1. Denholm, P., Clark, K., & O'Connell, M. (2016). *On the path to sunshot-emerging issues and challenges in integrating high levels of solar into the electrical generation and transmission system* (No. NREL/TP-6A20-65800). EERE Publication and Product Library.
2. Deng, M. J., Song, C. Z., Ho, P. J., Wang, C. C., Chen, J. M., & Lu, K. T. (2013). Three-dimensionally ordered macroporous Cu 2 O/Ni inverse opal electrodes for electrochemical supercapacitors. *Physical Chemistry Chemical Physics*, *15*(20), 7479-7483.

REFERENCE BOOKS

1. Deshpande, M. V. (2009). *Elements of electrical power station design*. PHI Learning Pvt. Ltd..
2. Mostafavi, S. A., & Hajabdollahi, H. (2020). Investigating the effect of high-pressure heater elimination on power generation of Shazand power plant. *International Journal of Energy and Water Resources*, *4*(4), 389-402.

3. Reddy, M. V., Hemanth, K. S., & Mohan, C. V. (2013). Microwave power transmission–a next generation power transmission system. *IOSR Journal of Electrical and Electronics Engineering (IOSR-JEEE)*, *4*(5), 24-28.

Title of Course: Repair and Maintenance of Home Appliances

Course Code: MCTE-404-EL

Course Description:

This course is designed to enable the students to understand the basic principles of semiconductor electronics devices. It also provides basic insight in the working and applications of power electronic devices in control Circuits. The course also includes simple problem solving.

- **Semester: VII**
- **Credit Hours: 3**
- **Pre-requisites course requirements/ skills NA**

Learning Objectives:

It is envisioned that all institutions will make efforts to follow the Outcome Based Education (OBE) system and focus on the learning and growth of the students. The curriculum is designed to enable the students to learn, understand, and apply the fundamental and advanced concepts of electronics. This curriculum should be taught in such a manner that it produces scientists with sufficient hands-on skills and problem-solving mindset, to contribute effectively to the profession. To derive the maximum benefits from this curriculum, the students should be provided ample opportunities to polish their communication skills, exhibit ethical behavior and effective leadership, and prepare themselves to be a responsible professional of the society.

Learning outcomes

After studying this course, you should be able to:

- recognize a variety of exciting high-tech products and systems enabled by electronics
- manipulate voltages, currents, and resistances in electronic circuits
- demonstrate familiarity with basic electronic components and use them to design simple electronic circuits
- see how signals can be represented in the time and frequency domains for Fourier analysis
- Record, analyses, and filter audio signals to improve their fidelity.

Unit-I

1 UNDERSTAND TYPES OF BASIC SEMI-CONDUCTOR

1.1 Explain the terms-semi-conductor, intrinsic and extrinsic.

1.2 Explain P and N type doping

1.3 State majority and minority charge carriers in P & N type semi-conductors

2 UNDERSTAND THE CONSTRUCTION AND APPLICATIONS OF PN DIODES AS RECTIFIER

2.1 Explain formation of PN-junction.

2.2 Define potential barrier of PN junction.

2.3 Compare forward bias and reverse bias.

2.4 Discuss static volt ampere characteristics of diode (forward and reverse bias).

2.5 State applications of diode.

2.6 Draw and discuss half wave rectification circuit (with wave forms).

2.7 Draw and discuss full wave rectification circuit (with waveforms) by using:

a. Centre tapped transformer.

b. Bridge rectifier.

2.8 Explain the need of filters in DC power supply

2.9 Draw circuit diagram of filtering network (T & Pi).

2.10 Define term ripple factor.

2.11 Describe use of diode as a switch.

3 UNDERSTAND WORKING AND USES OF ZENER AND PHOTO DIODES

3.1 Explain the working and construction of Zener diode

3.2 Explain the behavior of Zener diode in Breakdown region.

3.3 give ratings of Zener diode.

3.4 Explain the Zener diode in power supplies and voltage regulation circuits.

3.5 Describe construction & working of photo diode.

3.6 Draw photodiode control circuit.

4 UNDERSTANDING CONSTRUCTION, WORKING AND USES OF BIPOLAR JUNCTION

TRANSISTOR (BJT)

4.1 Explain construction of transistors.

4.2 Constructional details of PNP and NPN transistor.

4.3 Draw PNP and NPN transistor circuits with proper biasing.

4.4 Describe principle of working of transistor as amplifier.

4.5 Describe current gain, voltage gain & power gain of a CE amplifier.

4.6 List uses of transistors. a. As a switch. b. As voltage & current amplifier.

5 UNDERSTAND THE WORKING AND USES OF FIELD EFFECT TRANSISTORS

5.1 Explain the construction & working of JFET.

5.2 List types of FET and their uses.

5.3 Describe use of JFET as an amplifier.

5.4 Explain construction of MOSFET.

5.5 Draw symbols of IGFET and MOSFETS

5.6 State special handling procedures of MOSFETS

6 UNDERSTAND THE TYPES, WORKING AND USES OF THYRISTORS

CONTROLLED RECTIFIER, DIAC, TRIAC

6.1 Define a thyristor.

6.2 Explain construction and working operation of SCR's.

6.3 Draw equivalent model of SCR by two transistors analogy.

6.4 Explain phase control of SCR.

6.5 Explain use of SCRs as AC & DC Power control circuits with the help of circuit diagrams.

6.6 Explain the operation of Diac.

6.7 Draw characteristics & waveforms of Diac.

6.8 Explain the construction and working of TRAIAC

6.9 Enlist applications of Diac & Triac.

7 UNDERSTAND WORKING AND USES OF SPECIAL SOLID-STATE DEVICES SUCH AS UNIJUNCTION TRANSISTOR (UJT), PHOTO TRANSISTOR, LIGHT ACTIVATED SILICON

CONTROLLED RECTIFIER (LASCR), OPTO COUPLER

7.1 Explain the construction and working of UJT.

7.2 State the equation for Peak Firing Voltage

7.3 Draw characteristic curve of UJT

7.4 Enlist common applications of UJT

7.5 Explain Saw-tooth oscillator using UJT, with the help of circuit diagram

7.6 Explain the working of photo transistor.

8 UNDERSTAND THE WORKING OF LOGIC GATES, USING TRUTH TABLES

8.1 Define the logic gates NOT, OR, AND, NAND, NOR XOR, XNOR.

8.2 Draw truth tables for the logic gates, showing symbols and equations.

8.3 Explain logic gates, using TTL circuitry.

Unit II

GENERAL ELECTRONICS LIST OF PRACTICALS

1. To construct a half wave rectifier circuit and to check its output on oscilloscope.

2. To construct a full wave rectifier circuit and measure the input & outputs wave forms.

3. Demonstrate the effects of filter capacitance on DC output voltage and ripple.

4. Measure and plot the line voltage regulation properties of a typical shunt-type Zener diode voltage regulator.

* Students should prepare the projects mentioned above and retain them for final evaluation.

** Students should also prepare practical notebooks and get it checked weekly by the concerned teacher. They should also produce it to external examiner for sessional work/marking check up at the time of final exam.

Note: The Projects shown are only a reference to their level of complexity. The teachers may select other projects involving solid state devices and/or IC's.

Assessment and Examinations
Assessment will be done as per university/department policy.

Sr. No.	Elements	Weightage	Details
1.	MidtermAssessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

BOOKS:

1. Grob, B. (1977). Basic Blectronlcs.
2. Bogart, T. F. (2004). *Electronic devices and circuits*. Pearson Education India.
3. Berlin, H. M., Rankinen, J. L., & Moser, R. L. (1984). *Experiments in Electronic Devices*. CE Merrill Publishing Company.
4. Duncan, T., Murray, J., & Emery, C. (1985). Electronics for today and tomorrow.
5. Tocci, R. J. (1991). *Digital systems: principles and applications*. Pearson Education India.

a. Electronics (Area of Specialization)

Title of Course: PRINCIPLE OF ELECTRONICS

Course Code: MCTE-401-ET

Course Description:

This course is designed to enable the students to understand the basic principles of semiconductor electronics devices. It also provides basic insight into the working and applications of power electronic devices in control Circuits. The course also includes simple problem-solving.

- Semester: VII
- Credit Hours: 3
- Pre-requisites course requirements/ skills NA

Learning Objectives:

It is envisioned that all institutions will make efforts to follow the Outcome Based Education (OBE) system and focus on the learning and growth of the students. The curriculum is designed to enable the students to learn, understand, and apply the fundamental and advanced concepts of electronics. This curriculum should be taught in such a manner that it produces scientists with sufficient hands-on skills and problem-solving mindset, to contribute effectively to the profession. To derive the maximum benefits from this curriculum, the students should be provided ample opportunities to polish their communication skills, exhibit ethical behavior and effective leadership, and prepare themselves to be a responsible professional of the society.

Learning outcomes

After studying this course, you should be able to:

- recognize a variety of exciting high-tech products and systems enabled by electronics
- manipulate voltages, currents, and resistances in electronic circuits
- demonstrate familiarity with basic electronic components and use them to design simple electronic circuits
- see how signals can be represented in the time and frequency domains for Fourier analysis
- Record, analyses, and filters audio signals to improve their fidelity.

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1.2 Explain P and N type doping

1.3 State majority and minority charge carriers in P & N type semi-conductors

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2.1 Explain formation of PN-junction.

2.2 Define potential barrier of PN junction.

2.3 Compare forward bias and reverse bias.

2.4 Discuss static volt ampere characteristics of diode (forward and reverse bias).

2.5 State applications of diode.

2.6 Draw and discuss half wave rectification circuit (with wave forms).

2.7 Draw and discuss full wave rectification circuit (with waveforms) by using:

a. Centre tapped transformer.

b. Bridge rectifier.

2.8 Explain the need of filters in DC power supply

2.9 Draw circuit diagram of filtering network (T & Pi).

2.10 Define term ripple factor.

2.11 Describe use of diode as a switch.

3 UNDERSTAND WORKING AND USES OF ZENER AND PHOTO DIODES

3.1 Explain the working and construction of Zener diode

3.2 Explain the behavior of Zener diode in Breakdown region.

3.3 give ratings of Zener diode.

3.4 Explain the Zener diode in power supplies and voltage regulation circuits.

3.5 Describe construction & working of photo diode.

3.6 Draw photodiode control circuit.

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4.2 Constructional details of PNP and NPN transistor.

4.3 Draw PNP and NPN transistor circuits with proper biasing.

4.4 Describe principle of working of transistor as amplifier.

4.5 Describe current gain, voltage gain & power gain of a CE amplifier.

4.6 List uses of transistors a. As a switch. b. As voltage & current amplifier.

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5.1 Explain the construction & working of JFET.

5.2 List types of FET and their uses.

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5.4 Explain construction of MOSFET.

5.5 Draw symbols of IGFET and MOSFETS

5.6 State special handling procedures of MOSFETS

6 UNDERSTAND THE TYPES, WORKING AND USES OF THYRISTORS SPECIALLY SILICON

CONTROLLED RECTIFIER, DIAC, TRIAC

6.1 Define a thyristor.

6.2 Explain construction and working operation of SCR's.

6.3 Draw equivalent model of SCR by two transistors analogy.

6.4 Explain phase control of SCR.

6.5 Explain use of SCR's as AC & DC Power control circuits with the help of circuit diagrams.

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7.1 Explain the construction and working of UJT.

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8.1 Define the logic gates NOT, OR, AND, NAND, NOR XOR, XNOR.

8.2 Draw truth tables for the logic gates, showing symbols and equations.

8.3 Explain logic gates, using TTL circuitry.

LIST OF PRACTICALS

1. To construct a half wave rectifier circuit and to check its output on oscilloscope.

2. To construct a full wave rectifier circuit and measure the input & outputs wave forms.

3. Demonstrate the effects of filter capacitance on DC output voltage and ripple.

4. Measure and plot the line voltage regulation properties of a typical shunt-type Zener diode voltage regulator.

5. Assemble an alarm circuit using a photo conductive cell (Project).

6. Assemble a Regulated Power Supply Circuit (Project)

7. Identify base - emitter and collector terminals and connections of NPN and PNP transistors.

* Students should prepare the projects mentioned above and retain them for final evaluation.

** Students should also prepare practical notebooks and get it checked weekly by the concerned teacher. They should also produce it to external examiner for sessional work/marking check up at the time of final exam.

Note: The Projects shown are only a reference to their level of complexity. The teachers may select other projects involving solid state devices and/or IC's.

Assessment and Examinations

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3	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

BOOKS:

1. Qasem, A., Hassaan, M. Y., Moustafa, M. G., Hammam, M. A., Zahran, H. Y., Yahia, I. S., & Shaaban, E. R. (2020). Optical and electronic properties for As-60 at. % S uniform thickness of thin films: Influence of Se content. *Optical Materials*, *109*, 110257.

2. Bogart, T. F. (2004). *Electronic devices and circuits*. Pearson Education India.

3. Experiments in Electronic Devices by Berlin (2nd Edition).

Title of Course: INDUSTRIAL ELECTRONICS

Course Code: MCTE-402-ET

Course Description:
As the application of solid-state electronics in the control of electrical systems is increasing rapidly, the 2nd half of this course provides reasonable knowledge of power electronics including control of AC/DC motors, synchro-servo system etc. concepts and applications of Programmable Logic Controllers (PLC) have also been included.

- Semester:
- Credit Hours: 3
- Pre-requisites course requirements/ skills NA

Course objective

Analyze the steady state and small signal AC response of simple electronic circuits containing diodes, transistors, and operational amplifiers Apply performance criteria in the design of basic amplifier circuits and verify that the criteria were met. Design and analyze circuits containing digital components and microprocessors. Analyze and evaluate performance parameters of AC and DC motors.

Course outcomes

1. Students will be expected to attend class regularly and be responsible for all information presented in class.
2. Students will be expected to participate and contribute to the class as appropriate.
3. Students will be expected to perform satisfactorily on all written/lab assignments.

4. Make satisfactory scores on quizzes and examinations. The instructor reserves the right to change this syllabus at any time during the semester. All changes will be announced in class in advance.

Course content

Unit 1

1. **POWER DIODES & THYRISTORS.**

1.1 Construction, ratings, and characteristics of power diodes

1.2 Series & parallel operation of power diodes

1.3 Review of SCR, its characteristics

1.4 SCR phase control

1.5 Series & parallel operation of SCR's

1.6 IGBT as a switch, its characteristics and operation through gate drivers

2. **CONTROLLED RECTIFIERS (1-PHASE & 3-PHASE)**

2.1 Basic controlled rectifier circuits

2.2 Forced commutated controlled rectifier circuit (1-Phase & 3-Phase)

2.3 Naturally commutated controlled rectifier circuit (1- Phase & 3-Phase)

3. **INVERTERS.**

3.1 1-Phase full-wave inverter circuit

3.2 3-phase full-wave bridge circuit as a line-commutated invertor

3.3 Four quadrant controls

4. **CONTROL OF DC & AC MOTORS.**

4.1 DC motor speed control system

4.2 3-phase full-wave controlled rectifier circuit to control DC motors

4.3 1-phase full-wave controlled rectifier circuit to control DC motor

4.4 Introduction to speed control of induction motors 4.5 SCR cyclo-converter.

4.6 Open-loop & closed-loop induction motor speed control.

5. **SYNCHRO-SERVO SYSTEMS.**

5.1 Synchro-generator and synchro-motor

5.2 Differential synchro

5.3 AC & DC servomechanism

5.4 Servo motors, characteristics & uses

6. **PROGRAMMABLE LOGIC CONTROLLER (Dedicated PLC's.)**

6.1 Introduction to PLC's

6.2 ladder logic inputs, ladder logic outputs, symbols

6.3 Input and output modules
6.4 Relays, Timers, and counters
6.5 Modes of operation
6.6 Ladders and Rungs
6.7 Multiple contacts
6.8 Use of A/D and D/A converters
6.9 Programming and operation of simple motor control circuits for given ladder logic. **(Computer Software Control.)**
6.10 Ladder relay instructions
6.11 Ladder timer instructions
6.12 Ladder counter instructions

Assessment and Examinations

Assessment will be done as per university/department policy.

TEXT/REFERENCE BOOKS

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

1 Malvino, A. P., Bates, D. J., & Hoppe, P. E. (1993). *Electronic principles*. Glencoe.
2 Electronics in Industry by Chute
3 Fengru, R. E. N. T. J. I. N. X. (2003). EFFECT OF BELL-LESS CHUTE DESIGN PARAMENTERS ON BURDEN DISTRIBUTION IN BF [J]. *Iron and Steel*, *11*.
4 Williams, B. W. (1987). *Power electronics: devices, drivers, and applications*. Macmillan International Higher Education.
5 Datta, S. K., & Datta, S. K. (1985). *Power electronics and controls*. Reston Publishing Company.

6 Ferreira, H. C., Lampe, L., Newbury, J., & Swart, T. G. (Eds.). (2011). *Power line communications: theory and applications for narrowband and broadband communications over power lines*. John Wiley & Sons.
7 GRAPHICS, P. C. (1988). New LOW-COST High Accuracy Rotary Position Sensors, AC or DC Powered. *Mechanical Engineering*, 107.
8 Brown, K. (2009). *Concise encyclopedia of pragmatics*. Elsevier.

Course Name: EQUIPMENT MAINTENANCE & SERVICING

Course Code: MCTE-403-ET

Course Description:

Based on sound principles of electrical and electronics engineering, this area has become the backbone of present-day economy. Knowledge of state-of-the-art equipment and practices such as digital communication have been included in this course

- Semester:
- Credit Hours: 3
- Pre-requisites course requirements/ skills NA

Course OBJECTIVES

1. understanding basic terms and principles of signal processing in
2. telecommunication transmission,
3. describing basic principles of the modern digital
4. telecommunications,
5. implementing acquired knowledge in professional specialist
6. courses (theoretical and practical),
7. understanding basic operation settings for telecommunication
8. systems and equipment.

Learning Outcome

1. explain basic physical and technical principles of modern digital
2. telecommunications,
3. describe basic principles of operation in modern digital
4. telecommunication equipment and systems,
5. demonstrate measurements and experiments in laboratory on
6. actual components, devices, equipment, and systems in
7. telecommunications,
8. describe development and implementation methods of
9. telecommunication systems,
10. examine communication equipment for the technical functionality

1. Understand principles of Color TV Receiver.

1.1Discuss basic Concepts of Color TV Receiver

1.2 Draw Block Diagram of Color TV Receiver

1.3 Describe construction and working of VHF-UHF Tuner, S-Band, Hyper band

1.4 Discuss IF Subsystem

1.5 Describe Luminance Channel

1.5 Discuss Chroma Decoder

1.6 Discuss Color Picture Tubes

1.6.1 Discuss construction and working principles of Precision in Line Colour Picture tube

1.6.2 Discuss construction and working principles of Trintron Colour Picture Tube

1.7 Discuss construction and working principles of Satellite TV Receivers

2. Understand construction and working of Camera Tubes

2.1 Discuss Photosensitive materials with respect to types and uses.

2.2 Discuss principles of Optical-electrical Conversion

2.2 Discuss construction and working principles of Vidicon Camera Tube

2.3 Discuss construction and working principles of Plumbicon Camera Tube

2.4 Discuss construction and working principles of Solid-State Camera Tube

3. Understand Video Disk System

3.1 Discuss Video Display Unit

3.1.1 Discuss construction of Video Monitor

3.1.2 Discuss construction of LCD Displays

3.1.3 Discuss construction of Plasma Displays

3.1.4 Discuss construction of Large Screen

3.2 Discuss construction of Close Circuit TV

3.3 Describe features/ specifications of VTR/ VCR

3.4 Describe basic concepts of High-Definition Television

4. Understand Working of Microwave Oven

4.1 Discuss operating principles Microwave Oven

4.2 Draw block Diagram of Microwave Oven

4.3 Describe features of Microwave Oven

5. Understand Working of Remote Control

5.1 Discuss operating principles of Remote Control

5.2 Draw block Diagram of Remote Control

6. Understand Working of Video Games

6.1 Discuss operating principles of Video games

6.2 Draw block Diagram of Video games

6.3 Describe features of Video games

7. Understand Working of Washing Machine 7.1 Describe Fuzzy Logic

7.2 Describe Washing Machine with Fuzzy logic

4.1 Discuss operating principles of washing machine

4.3 Describe features of Washing Machine

8. Understand Working of Facsimile of Fax

8.1 Distinguish between Analog and Digital Communication

8.1 Describe operating principles Fax Machine

8.3 Discuss features of Fax Machine

9. Understand Working of Cellular Phone

9.1 Describe the Cell Approach

9.2 Discuss operating principles of Cellular phones

9.3 Discuss functions perform by Cellular Phones

9.4 Describe features of Cellular Phones

10. Understand Working of Wireless Phone or Cordless Phone

10.1 Describe operating principles of Wireless Phones.

10.2 Draw block Diagram of base unit

10.3 Draw block Diagram of Handset unit

10.3 Describe features of Wireless Phone

11. Understand Working of Digital Calculators & Diaries

11.1 Describe operating principles of Digital Calculators and Diaries.

11.2 Draw block Diagram of Digital Calculators and Diaries.

11.3 Discuss features of Digital Calculators and Diaries.

Assessment and Examinations

Assessment will be done as per university/department policy.

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.

2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

RECOMMENDED BOOKS.

1 Understanding Telecommunications Networks by Andy R Valdar, The Institution of Engineering and Technology 2nd Edition (2017)

2 The Essential Guide to Telecommunication by Annabel Z. Dodd, Prentice Hall (2019)

Course Name: **CCTV Security Surveillance**

Course code: MCTE-404-ET

Course Description

CCTV Security Surveillance Course will make the students well proficient with the basic components of CCTV cameras and will make them familiar with CCTV accessories, spare parts, tools, instruments, and other equipment related to GSM/CDMA/WAP and will make them able to diagnose the problems and repair any kind of CCTV by using proper and accurate tools and instruments.

- **Semester: VII**
- **Credit Hours:**
- **Pre-requisites course requirements/ skills: Basic Electronics**

Learning outcomes:

After completing this course, students will be able to:

- Interact with the customer to identify and understand their requirements.
- Install and Repair dysfunctional system.
- Identify dysfunctional components through visual inspection and by use of multi meter
- To understand CCTV camera installation requirement in terms of equipment, system, tools, applications appropriate for a particular site.

- Select Suitable cameras & DVR to provide the better solution to the customers.
- Read and Comprehend signs, labels, and warning
- Communicate effectively
- Follow behavior etiquettes while interacting with others

Course Content.

CCTV Camera Security

Basic Electronics, Electronic Components and SMD Components
Power Supply Circuit Concepts
Soldering and DE Soldering
Testing Electronics Components

- How to use Digital Multi Meter
- How to test normal electronic component, resister, capacitor, Diode, Transistor, Mosfet, Coil, Fuse … etc
- How to test SMD electronic component, resister, capacitor, Diode, Transistor, Mosfet, Coil, Fuse … etc

CCTV Camera Installation and Maintenance

- Introduction to CCTV installation
- Elements of a basic CCTV system: - Camera, monitor and digital recorder.
- Camera types and uses: - Fixed and movable, indoor and outdoor, monochrome and colour, day and night.
- Camera specifications: - Sensitivity, signal to noise ratio and resolution.
- Back Focus adjustment.
- Lens types: - Fixed and variable focal length, manual and motorized zoom.
- Use of lens calculator.
- Scene illumination: - Lighting considerations, LED's, infrared lamp maintenance and bulb life.
- Switches, Quads, Multiplexers, and control systems: – Types and applications.
- Monitors and Multiple screen displays.
- Recording the footage: - Analogue and Digital video recorders.
- Time-lapse recording. Reviewing video footage.
- Cables and connectors: – Types, uses, limitations, preparation, and testing.
- Introduction to Digital CCTV and IP technology.
- Connection to other security systems.
- Use of test equipment.
- Relevant standards, issues and the "Operational Requirement".
- The Analogue or Digital option? Changing technology and keeping updated.
- CCTV Video signals (H 264, Mpeg 2)
- Cabling and connectors (CAT5, CAT6 & Coax)
- Crimping BNC, CAT5 & keystone connectors
- Video transmission (analogue to digital, megapixel cameras)

- Assembling a CCTV system
- IP camera installation (IP installer for IP cameras, parameter setting)
- Introduction to lenses and lens theory (Field of view, vari focal and fixed lenses)
- Digital CCTV storage and lighting (DVR storage calculator, Illumination, and camera sensitivity in CCTV)
- Network (LAN, WAN, IP)
- P2p connectivity
- CCTV site survey
- Legislation issues
- Mobile phone viewing configuration
- Configuring domain name server (DNS)
- Learning about different types of routers
- What is DVR Stand Alone, How DVR Works, DVR Future
- Working Block Diagram of DVR Stand Alone device
- IP Camera and NVR technologies
- IP Camera and NVR Installation and Configuration
- PoE Switch, Working with Baluns.
- Cloud Technologies related to CCTV Camera Security

- **Assessment and Examinations**:

  Assessment will be done as per university/department policy.

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Textbook:

1. Cohen, N., Gattuso, J., & MacLennan-Brown, K. (2009). *CCTV operational requirements manual 2009*. London: Home Office.

Reference Books:

1. Srimuk, P., Mitatha, S., & Yupapin, P. P. (2010). Novel CCTV security camera system using DWDM wavelength enhancement. *Procedia-Social and Behavioral Sciences*, *2*(1), 79-83..
2. Solanki: Solar Photovoltaics: Fundamentals, Technologies, and Applications. PHI Learning Pvt Ltd, 2009

f). Industrial Management (Area of Specialization)

Title of Course: Organizational Behavior

Course Code: MCTE-401 IM

Course Description:

Organizational Behavior: (a) the individual, (b) groups, and (c) structure. The goal is to make organizations perform more effectively and efficiently in a sustainable manner. Robbins and Judge argued that core topics in OB include "motivation, leader behavior and power, interpersonal communication, group structure and processes, learning, attitude development and perception, change processes, conflict, work design, and work stress."

- Semester: VII
- Credit Hours: 3+1
- Pre-requisites course requirements/ skills NA

Course Objectives

You will be able to:

Acquire a deeper understanding of your character, personality, and strengths as well as your mission, vision, and values through conversations, reflection, and assessments. Experience working together in groups and teams towards developing job-relevant skills: conceptual, human, and technical. Explain the OB model and basic principles of leading and managing, including ethical norms, that affect organizational behavior. Analyze the dynamics of effective people engagement as a source of sustainable competitive advantage; and imbibe the "whole person in a whole job" philosophy as an integral part of the design structure.

Learning Outcome

After successfully completing this program, you should be able to:

Demonstrate the applicability of the concept of organizational behavior to understand the Behavior of people in the organization.

Demonstrate the applicability of analyzing the complexities associated with management of individual behavior in the organization.

Analyze the complexities associated with management of the group behavior in the

organization.
Demonstrate how the organizational behavior can

COURSE CONTENTS

UNIT 1:
Introduction to the Field of Organizational Behaviour

UNIT 2:
Individual Behaviour, Personality and Values

UNIT 3:
Perceiving Ourselves and Others in Organizations

UNIT 4
Workplace Emotions, Attitudes, and Stress

UNIT 5:
Foundations of Employee Motivation

UNIT 6:
Applied Performance Practices

UNIT 7:
Decision Making and Creativity

TEAM PROCESSES

UNIT 8:
Team Dynamics

UNIT 9:
Communicating in Organizations

UNIT 10:
Power and Influence in the Workplace

UNIT 11:
Conflict and Negotiation in the Workplace

UNIT 12:
Leadership in Organizational Settings

UNIT 13:
Designing Organizational Structure

Assessment and Examinations

Assessment will be done as per university/department policy.

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.

2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess

Books Recommended:

1. Barker, J. A. (1992). *Future edge*. New York: William Morrow and Company.
2. Covey, S. (1998). *The 7 habits of highly effective teens*. New York: Simon & Schuster. Covey, S. R. (1991). *Principle-centered leadership*, New York: Summit Books.
3. De Leon, E. B. (1998). *Live, love, laugh forever.* Manila: National Book Store Publishing.
4. Frick, D. M, & Spears, L. C. (Eds.) (1996). *On becoming a servant leader: The private writings of Robert K. Greenleaf.* San Francisco: Jossey-Bass.
5. Greenleaf, R. K. (2002). *Servant leadership: A journey into the nature of legitimate power & greatness.*

Title of Course: INDUSTRIAL SAFETY

Course Code: MCTE-403 IM

Course Description:

This course introduces the principles of industrial safety. Emphasis is placed on industrial safety and OSHA regulations. Upon completion, students should be able to demonstrate knowledge of a safe working environment and OSHA compliance.

- Semester:
- Credit Hours: 3
- Pre-requisites course requirements/ skills NA

Course Objectives

To develop highly qualified professional manpower the basic requirement lies on systematic quality-based coaching and training in Advanced Science and Technologies. Therefore, the course is designed to train and provide expert human resource to safety management and expected to bring direct benefits to industry and society. The course is based on following objectives:

1. To develop an expert manpower to handle the complex industrial environment.
2. To give knowledge about occupational health, industrial hygiene, accidental prevention techniques to the students.

3. To make the student aware about safety auditing and management systems, pollution prevention techniques etc.
4. To train the students about risk assessment and management.

Learning Outcome

Upon completion of this course, the student will be able to:

a. Apply laws and regulations relevant to industrial safety.
b. Demonstrate proper use of personal protective equipment.
c. Apply techniques of safe materials handling.
d. Understand principles of electrical safety in the industrial environment

COURSE CONTENTS

UNIT- I

Occupation, Safety and Management; Occupational Safety, Health and Environmental Safety, Management – Principles & practices, Role of Management in Industrial Safety, Organization Behavior in Human factors contributing to accident. Planning for Safety: Planning: Definition, purpose, nature, scope, and procedure. Management by objectives and its role in Safety, Health and Management (SHE)

UNIT-II

Monitoring for Safety, Health & Environment: Occupational Safety, Health and Environment Management System, Bureau of Indian Standards on Safety and Health: 14489 – 1998 and 15001 – 2000, ILO and EPA Standards. Principles of Accident Prevention: Definition: Incident, accident, injury, dangerous, occurrences, unsafe acts, unsafe conditions, hazards, error, oversight, mistakes etc.

UNIT-III

Education, Training and Employee Participation in Safety: Element of training cycle, Assessment of needs. Techniques of training, design, and development of training programs. Training methods and strategy types of training. Evaluation and review of training programs. Competence Building Techniques (CBT), Concept for training, safety as a on-line function. Employee Participation: Purpose, areas of participation, methods, Role of trade union in Safety, Health and Environment Protection.

UNIT-IV

Management Information System: Sources of information on Safety, Health and Environment Protection. Compilation and collation of information, Analysis & use of modern methods of programming, storing and retrieval of MIS for Safety, Health and Environment. QCC HS Computer Software Application and Limitations.

Assessment and Examinations

Assessment will be done as per university/department policy.

Sr. No.	Elements	Weightage	Details

1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Books Recommended:

1. Barker, J. A. (1992). Future edge. New York: William Morrow and Company.
2. Covey, S. (1998). The 7 habits of highly effective teens. New York: Simon & Schuster. Covey, S. R. (1991). Principle-centered leadership, New York: Summit Books.
3. De Leon, E. B. (1998). Live, love, laugh forever. Manila: National Book Store Publishing.
4. Frick, D. M, & Spears, L. C. (Eds.) (1996). On becoming a servant leader: The private writings of Robert K. Greenleaf. San Francisco: Jossey-Bass.
5. Greenleaf, R. K. (2002). Servant leadership: A journey into the nature of legitimate power & greatness.
6. Mahwah, NJ: Paulist Press.
7. Spears, L. C. (Ed.) (1998). The power of servant leadership. San Francisco: Berrett-Koehler. Kouzes, J. M., & Posner, B. Z., (2007). The leadership challenge (4th ed). Jossey-Bass.
8. Lowney, C. (2003). Heroic leadership: best practices from a 450-year-old company that changed the world. Chicago:ILL: Loyola Press.
9. Maxwell, J. (1998). The 21 Irrefutable laws of leadership: Follow them and people will follow you.
10. Nashville, TN: Thomas Nelson.
11. Matthews, A. (1997). Follow your heart. Queensland, Australia: Seashell Publishers. United Nations (2000). Good Governance. New York: UN Publishing

Title of Course: Project Management

Course Code: MCTE-404 IM

Course Description:

Foundational course in project management. Students gain a thorough grounding in project management principles and techniques, including project life cycle, chartering, stakeholder

management, work/task breakdown, network diagram and critical path, contingency planning, resource allocation, and project monitoring, and
reporting.

- Semester: VIII
- Credit Hours: 3+1
- Pre-requisites course requirements/ skills NA

Course Objectives

Course outcomes

1. identify common phases in the project life cycle (initiating, planning, executing, and closing) and list activities critical to each.

2. analyze new project constraints (time, resources, performance) and identify trade-offs between them

example, if timely project completion date is critical, a company may expend more resources and perhaps reduce quality expectations if a deadline is at risk

3. identify project stakeholders and their needs and prioritize stakeholders' impacts to the project by the following criteria: proximity to the project, power, and urgency (time sensitivity

4. create a project work breakdown structure that accurately reflects a given project's scope and includes individual work packages, each scaled for a single owner.

5. employ a work breakdown structure to develop a network diagram that accurately reflects duration and sequencing of project activities, earning Outcome

COURSE CONTENTS

UNIT 1

● Read Chapter 1
● Participate in the Module 1 lesson
○ Navigate through the videos
○ Complete the checkpoint quiz (untimed essay)
● Participate in the checkpoint discussion (optional)

UNIT *2*

● Read Chapter 4
● Participate in the Module 02 lesson
○ Review the sample charter document
○ Navigate through the videos
○ Complete the checkpoint quiz (untimed essay)
● Participate in the checkpoint discussion (optional)
● Participate in “Discuss Your Past Projects” forum
● Complete Mini-Quiz 1 (essay format)

UNIT 3

● Read Chapter 5

● Participate in the Module 03 lesson
○ Navigate through the videos
○ Complete the checkpoint quiz (untimed essay)
● Participate in the checkpoint discussion (optional)
● Participate in "Team Communication Challenges" forum
● Submit Project Charter Assignment
● Complete Quiz 1 (timed multiple choice)

UNIT 4

● Read Chapter 6
● Participate in the Module 04 lesson
○ Navigate through the videos
○ Complete the checkpoint quiz (untimed essay)
● Participate in the checkpoint discussion (optional)
● Participate in "Birdhouse Project" forum
● Complete Mini-Quiz 2 (essay format)
● Complete Quiz 2 (timed multiple choice)

UNIT *5*

● Read Chapter 7
● Participate in Module 05 Part 1 lesson
○ Navigate through the videos
● Participate in Module 05 Part 2 lesson
○ Navigate through the videos
○ Complete the checkpoint quiz (untimed essay)
● Participate in the checkpoint discussion (optional)
● Participate in the "Network Diagram Discussion" forum
● Participate in the "WBS Draft" forum by submitting your draft and providing feedback to your peers

UNIT 6

● Read Chapter 8
● Participate in the "Agile" forum
● Participate in the "Quiz 3 Study" forum
● Complete Quiz 3 (timed multiple choice)

UNIT 7

● Read Chapter 9
● Participate in "Costs" forum
● Submit WBS Final Draft Assignment

UNIT 8

● Read chapters 10-11
● Participate in "Risk" forum
● Complete Mini-Quiz 3 (essay format)
● Participate in the "Quiz 4 Study" forum
● Complete Quiz 4 (timed multiple choice)

UNIT 9

● Read chapters 13, 14, and 15
● Participate in "Project Team Characteristics" forum
● Participate in the "Network Diagram Draft" forum by submitting your draft and providing feedback to your peers

UNIT 10

● Participate in "Lessons Learned" discussion
● Complete Mini-Quiz 4 (essay format)
● Participate in the "Quiz 5 Study" forum
● Complete Quiz 5 (timed multiple choice)

UNIT 11

● Submit Network Diagram Final Draft Assignment
● Review Final Exam Study Guide
● Complete Final Exam (timed multiple choice) term

Assessment and Examinations

Assessment will be done as per university/department policy.

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Textbook:

Walker, A. (2015). *Project management in construction*. John Wiley & Sons.

Suggested Books:

Clough, R. H., Sears, G. A., & Sears, S. K. (2000). *Construction project management*. John Wiley & Sons.

Gido, J., & Clements, J. (2014). *Successful project management*. Cengage Learning.

g). <u>Designing and Experimental Crafts (Area of Specialization)</u>

Title of Course: DRAFTING AND PATTERN MAKING

Course Code: BSTE 431

Course Description:

Drafting basic patterns. Flat pattern manipulation for a variety of designs. Construction of basic slope and selected samples. Introduction to the application of computer patternmaking.

- Semester: VII
- Credit Hours: 3+1
- Pre-requisites course requirements: Successfully completed basic course of Designing and experimental Craft.

Course Objectives

The objectives of this course are to:

- Increase standing stamina
- Follow the given instruction
- Identify tools according to their uses
- Draft the pattern precisely
- Measure accurately
- Apply pattern manipulation tool basic design
- Enhance productivity and ensure quality of products
- Utilize pattern drafting and grading material effectively.
- Provide industry with skilled workers whose scope with job knowledge and skills are identified.
- Provide technical and vocational training which reflects the requirements of industry

Course outcomes

Upon successful completion of this course, students will be able to:

• Develop and plan the initial pattern draft analysis through independent research.
• Generate a variety of patterns, from original design sketches developed in FD 364, incorporating advanced pattern drafting principles.
• Evaluate the functions of a design and apply the correct ease for movement.
• Research and combine drafting methods, pattern manipulations, and garment fit.
• Support ideas and conclusions through research, planning, and development of a variety of pattern drafting methods.

• Assess complex fit issues and perform corresponding pattern alterations.
• Generate patterns consistent with industry standards.
• Produce detailed pattern specifications sheets and Bill of Materials.
• Integrate construction assembly methods, fabric, and seam type, to incorporate them into pattern development when drafting.
• Demonstrate professional work habits and terminology necessary to work efficiently and effectively in the apparel industry.
• Critically evaluate their work based on suggestions and recommendations by peers and industry professionals

COURSE CONTENTS

1. Introduction of Pattern making and focus on concept of body measurement

1.1. Define and explain importance of pattern making.

1.2. Use of tools for pattern making.

1.3. Use of scale and scale reading and writing.

2. Explain of different figure of children (Thin, Normal, Fat)

2.1. Explain analysis of children figure.

3. Take direct body measurement.

3.1. Using measurement tape take measurement of different body parts and different type of children wear.

3.2. Follow the size chart from 1 to 14 years of age (boys and Girls)

4. Use of terms and technology in pattern making

4.1. Knowledge of key pattern making and use of instruct owns and information require.

4.2. Use of seam allowances accurately on the pattern.

4.3. Use of notches arm holes, balance points and side seams.

4.4. Differentiate between all types of grain lin.

4.5. Specify all information properly on the final pattern.

5. Explain different size 3 to 6 years for straight skirt

5.1. Describe variations of skirts

6. Create sketch draft basic bodice block 3 to 6 year's children

6.1. Knowledge and development different technical detail of boys and girls

7. Describe of children garment from basic bodice

7.1. Explain girl garment variations.

7.2. Explain variation of sleeves simple, puff, flared, and other designs.

8. Describe construction of collar and deferent types of collars

8.1. Construct basic collar for girls.

8.2. Construct basic collars for boys.

9. Describe construction of frocks variations, alive, yoke, body, umbrella, frock

10. Describe drafting different types of pajamas 3 to 6 years age basic trouser, shalwar trouser unisex, and other designs.

List of Practical: Pattern Making –I 102 Hrs.

1. Practice of scale reading.
2. Figure analysis of children
3. Take direct body measurement.
4. Make comprehensive size chart according t measurement size chart from 1 to 14 years of age (boys and girls)
5. Draw sketch straight skirt (3 to 6 years).

5.1 Make a draft box / inverted pleat skirt and cut out pattern.

5.2 Make a draft and cut out pattern of panel skirt.

5.3 Make a draft and cut out pattern a line skirt.

6. Draw sketch bodice block 3 to 6 years.

6.1 Understand develop different technical detail of children (boys & girls).

7. Develop the girl's garment from basic block sleeves & frocks.

7.1 Draw sketch simple sleeve and cut pattern.

7.2 Construct draft and cut pattern puff sleeve.

7.3 Construct draft and cut pattern flared sleeve.

7.4 Make draft and cut pattern different sleeve designs.

8. Construct the collars for boys & Girls

8.1 Draw sketch basic collar and cut pattern.

8.2 Draw sketch and cut pattern of peter pan collar.

8.3 Draw sketch and cut pattern band / stand collar.

8.4 Draw sketch and cut pattern raffle collar.

9. Make draft and cut out pattern different types of frocks with all information.

9.1 A line frock

9.2 Yoke frock

9.3 Body frock

9.4 Umbrella frock

10. Make draft and cut out pattern different types of pajamas with all required information's.

10.1 Basic trouser (3 to 6 years age)

10.2 Shalwar

10.3 Trouser(unisex)

10.4 Trouser variations

11. Make draft and cut out pattern of bashert.

Assessment and Examinations

Assessment will be done as per university/department policy.

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Textbook:

- Holman, G. (1997). *Pattern Cutting Made Easy: A Step-by-Step Introduction*. Sterling Publishing Company.
- Cho, Y., Okada, N., Park, H., Takatera, M., Inui, S., & Shimizu, Y. (2005). An interactive body model for individual pattern making. *International Journal of Clothing Science and Technology*.

Suggested Readings

- Huang, Y. C., Yang, W. H., Hu, H. L., & Ho, C. C. (2021, July). The Patternmaking and Refinement of a Smart Compression Trouser Design for Taiwan University Football Team. In *International Conference on Applied Human Factors and Ergonomics* (pp. 50-58). Springer, Cham.

Course title: **Fashion Designing**
Course Code: BSTE 432

Course Description

This course is designed for students whose career direction will require knowledge of fashion as part of the professional prerequisites of contemporary world. History, types of design, application of these design in modern world, and understanding the fashion cycle & predicting trends highlighted. Major changes and development in the world of textiles science and garments industry will be covered.

- **Semester: VII**
- **Credit Hours: 3 +1**
- **Pre-requisites course requirements/ skills NA**

1. To promote an understanding of Fashion and Textile Design in relation to the needs of fashion, contractual furnishings, home textiles, and the business-to-business textile products.

2. To provide hands-on experience using a set of complex technologies found in industry today to build prototypical solutions to solve current needs.

3. To provide experience in responding to market opportunities with creative and innovative products that integrate a set of academic disciplines such as textile materials, design fundamentals, business fundamentals, sourcing, data mining of market information, and new developments in material science and engineering.

4. To create an educational environment that approximates the actual conditions in industry by building studios and workshops containing state-of-the-art systems, resources, technologies, and a community of creativity and innovation.

5. To develop strong multi-functional teamwork and communication skills using visual and verbal presentation assignments and interfaces with practitioners in the design community and the industry.

Learning Outcomes

Students will be able to:

- Familiar with the theories of fashion designing and their role in textile science and garments industry.
- Obtain a broad understanding about fashion cycle and predicting trends of modern world and recognize about fashion merchandising segments in textile science.

Contents

Unit 1: Introduction to the fashion design course

- General theory

- Getting inspiration
- What skills do you need?

Unit 2: History of fashion design

- Design, Styling, Fabric Study
- Garments in ancient society
- Fashion in $18^{th,}$ 19^{th} , and 20^{th} Century
- Why Change Fashion

Unit 3: Type of fashion design

- women's fashion
- men's fashion
- children's fashion

Unit 4: Application of Design

- Basic Design and Creativity
- Style
- Print and Patterns
- Draping
- Designing a garment

Unit 5: Understanding the fashion cycle and predicting trends

- Fashion cycle
- Fashion cycle important in trends
- Forecasting and trends
- Predicting what's next
- Pop culture and trends

Unit 6: The youth fashion market

- Why is fashion so important to youth?
- Celebrities and peer fashion

Unit 7: Fashion Management

- Fashion Forecasting
- Introduction of Merchandising

Unit 8: Fashion Merchandising

- Techniques of visual merchandising
- Buy, sell, promote and distribute fashion product
- After sales techniques and the focus of overall customer experience

Unit 9: Textile Science

- Raw materials
- Textile materials
- Clothing design
- Finishing

Unit 10: Producing garments

- Pattern making
- Sewing and assembling
- Textile Design
- Research design, sample making
- Visual merchandising

Teaching-Learning Strategies

This course is a lecture-based and project-based while student work integrated to offer ample opportunity for student in-put and participation. Moreover, specific experimentation with various materials will do.

Assessment and Examinations

Formative and summative assessment will be done during and at the end of semester through midterm, assignments, presentations, pop-up quizzes and final semester examination.

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.

2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Textbook(s):

- Barnard, M. (2014). *Fashion theory: An introduction*. Routledge.
- Falcão, C., & Simões-Borgiani, D. (2016). Inclusive Fashion Design: Interdisciplinary Practice in the Fashion Design Degree Program at SENAC-PE College. In *Advances in Design for Inclusion* (pp. 227-234). Springer, Cham.
- Jones, S. J. (2011). *Fashion design*. Quercus Publishing.
- Sorger, R., & Udale, J. (2017). *The fundamentals of fashion design*. Bloomsbury Publishing.
- Stecker, P. (1996). *The fashion design manual*. Macmillan Education AU.

Further Readings: -

- Choi, K. H. (2011). A comparative study on fashion design education in Europe and Korea-Focus on the educational cases in the UK, France, Italy and Korea. *Journal of the Korean Society of Clothing and Textiles*, *35*(10), 1199-1214.
- Elfeky, A. I. M., & Elbyaly, M. Y. H. (2021). Developing skills of fashion design by augmented reality technology in higher education. *Interactive Learning Environments*, *29*(1), 17-32.
- Ruppert-Stroescu, M., & Hawley, J. M. (2014). A typology of creativity in fashion design and development. *Fashion Practice*, *6*(1), 9-35.
- Shin, K. (2012). Work-integrated education in fashion design. *Asian Journal of Education and Learning*, *3*(1), 10-20.

Course Title: **Fabric Printing**
Course Code: BSTE 433

- **Semester VII**
- **Credit Hours 3+1**
- **Pre-Requisites: Fashion Designing course**

Course Description

Students learn the fundamentals of fabric printing. Starting with traditional block printing and stencil making techniques, students' progress to basic photo silk-screen printing on fabric to build a strong foundational knowledge and technical base. Students explore different approaches to the design and making of textile works through technical demonstrations, field trips, lectures, hands-on projects and collaborative and independent research. Studies include traditional and contemporary sources of art and design. They complete several projects and samples throughout an intensive hands-on studio experience. Health and safety protocols and practices play a significant role in this studio centered curriculum

Learning Outcomes

The student should be able to:

- Demonstrate proficiency in basic textile print techniques.
- Apply 2D design principles and colour theory to the development of studio concepts.
- Document studio practice through technical and process-based record-keeping in addition to sketchbook practice.
- Incorporate the terminology appropriate to textile methodologies in verbal and written form.
- Describe the historical and contemporary artistic context of craft & design practice.
- Apply materials and visual research to studio projects.
- Synthesize media, materials, and methods to create unique and visually effective surface design.

Contents

Unit 1: Drawing

- Life drawing / fashion drawing
- Nature Study
- Environment
- Composition

Unit 2: Design Development

- Exploration of Color
- Composition
- Evolution of Pattern

- Repeat Pattern

Unit 3: Fabric Design

- Aesthetics of fabric design
- Evolution of design
- Color combination etc.
- Thematic textile design.

Unit 4: Fabric Technology

- Classification of Fibers
- Basic Weaves
- Variation of plain weaves

Unit 5: Techniques of Fabric Printing

- Wood Block Printing
- Silk Screen Printing
- Roller Printing
- Transfer Printing
- Rotary Printing

Unit 6: Design for Machine Made and Hand-Crafted Textile

- Linen
- Handloom
- Block print
- Batik
- Embroidery

Unit 7: Direct Print Techniques

- spraying and masking
- open screen techniques
- screen printing.

Teaching-Learning Strategies

This course will be taught through technical demonstrations, field trips, lectures, hands-on projects and collaborative and independent research while student projects are integrated to offer ample opportunity for student in-put and participation.

Assessment and Examination

The students will be assessed according to the following criteria

Assignment/Project/Presentation/Review	25%
Mid Term Test	35%
Final Test	40%

Textbook(s):

Hu, J. (Ed.). (2008). Fabric testing.

Panda, H. (2010). *The Complete Book on Textile Processing and Silk Reeling Technology: Silk Reeling, Silk Reeling Methods, Silk Reeling Process, Sericulture, Textile Processing and Silk Reeling, Silk Reeling Industry, Sericulture Industry in India, Silk Textile Industry,*

Silk Reeling Machine, Profits in Silk Reeling, Silk Reeling Unit, Silk as Textile Fiber, Fabric Varieties, Chemical Modification of Textile Celluloses, Silk Reeling Technology. Asia Pacific Business Press Inc.

Ujiie, H. (2015). Fabric finishing printing textiles. In *Textiles and Fashion* (pp. 507-529). Woodhead Publishing.

Wells, K. (2000). *Fabric dyeing and printing*. Conran Octopus Limited.

Suggested Readings: -

Chen, L., Ding, X., & Wu, X. (2015). Water Management Tool of Industrial Products: A case study of screen-printing fabric and digital printing fabric. *Ecological Indicators*, *58*, 86-94.

Kan, C. W., Yuen, C. W. M., & Tsoi, W. Y. (2011). Using atmospheric pressure plasma for enhancing the deposition of printing paste on cotton fabric for digital ink-jet printing. *Cellulose*, *18*(3), 827-839.

Liu, G., Zhou, L., Zhang, G., Li, Y., Chai, L., Fan, Q., & Shao, J. (2017). Fabrication of patterned photonic crystals with brilliant structural colors on fabric substrates using ink-jet printing technology. *Materials & Design*, *114*, 10-17.

Rivett, A. (1938). Fabric printing. *Journal of the Association of Occupational Therapists*, *1*(2), 19-22.

Sadsunk, S. (2014). Fabric Printing Design: An Inspiration from Thai Kites. *International Journal of Humanities and Social Sciences*, *8*(5), 1387-1390.

Course title: **Interior Decoration**

Course Code: BSTE 434

Course Description

This course is designed to teach you how to be an interior designer by focusing on interior design from a micro and macro level. Interior design is an exciting profession that not only requires designers to be able to think creatively, but also to problem-solve. Interior designers are responsible for creating an environment for a structure, which may include a single-family home, government office, corporate headquarters etc. To create an interior environment, designers need to think about the form and functionality of the space. Interior decorators may not necessarily be interior designers; designers need to have more in-depth knowledge than decorators.

- **Semester: VIII**
- **Credit Hours 3+1**
- **Pre-requisites: Fabric Printing course**

Learning Outcomes

The student should be able to:

- Express themselves through visualizations, free hand drawings, collages, and mood boards as various mediums of conveying their concepts.
- Technical understanding of spatial layouts (room plans) drafted interior drawings and basic 3D development.
- Exposure on how to conceive and develop a project from start to finish along with introductions to designers in the professional field.

Contents

Unit 1: Introduction to Interior Design and Decoration

- What is interior design?
- Interior Design History,
- Interior Design vs Interior Decoration?
- Interior design specialties

Unit 2: Functional and Decorative Use of Colour

- Colour Psychology
- Existing Furniture and Furnishings
- Style of Décor
- Aspect and Natural Lighting,
- Spatial Relationships

Unit 3: Lighting Effects on Colour

- Incandescent
- Fluorescent
- Metal Halide
- High Pressure Sodium
- Mercury Vapour
- Tungsten,

- Tungsten Halogen.

Unit 4: Evolution of Design

- The evolution of form and function
- Architects and original interior designers
- Industrial Revolution and mainstream interior design
- Interior design in schools

Unit 5: Harmonious Decorative Colour Scheme

- Planning a Harmonious Decorative Scheme
- The Process of Planning
- Beginning of your Decoration Plan
- Displaying or Presenting your Design
- Visuals,
- Materials.

Unit 6: Decorating Styles

- Colonial
- Eclectic
- Modern
- Neo-Classical
- Victorian
- Other Decorating Styles

Unit 7: Building Systems and Components

- Architectural
- Structural
- Mechanical
- Electrical

Unit 7: Materials

- Concrete
- Masonry
- Stone
- Metals
- Wood
- Plastic
- Glass
- Wall Board
- Tile

- Terrazzo
- Acoustic Ceiling systems
- Resilient Flooring
- Carpet
- Paint and Other Film-Applied Finishes
- Wall covering
- Fabric and Textiles

Unit 8: Use of Interior Design

- Design and optimization
- Landscaping
- Architectural drawing
- Business of architect
- Realistic architecture
- Models in architecture
- 3D Modeling
- Fundamentals of 3D architectural visualization
- Computer architecture
- Contemporary architecture theory

Teaching-Learning Strategies

This course will be taught through technical demonstrations, field trips, lectures, hands-on projects and collaborative and independent research while student projects are integrated to offer ample opportunity for student in-put and participation.

Assessment and Examination

The students will be assessed according to the following criteria

Assignment/Project/Presentation/Review	25%
Mid Term Test	35%
Final Test	40%

Textbook(s):

Brunner, A. W., & Tryon, T. (1887). *Interior decoration*. WT Comstock.

Gere, C. (1989). *Nineteenth century decoration: the art of the interior*.

Martin, C. S. (1998). *Professionalization: Architecture, interior decoration, and interior design as defined by Abbott*. University of Minnesota.

Massey, A. (2008). *Interior design since 1900*. Thames & Hudson.

Suggested Readings: -

Havenhand, L. K. (2004). A view from the margin: Interior design. *Design Issues*, *20*(4), 32-42.

He, J. (2020, September). Interior Decoration Design and Construction Technology of Hardcover Room. In *Journal of Physics: Conference Series* (Vol. 1649, No. 1, p. 012005). IOP Publishing.

Lollar, C. T., Qin, J. S., Pang, J., Yuan, S., Becker, B., & Zhou, H. C. (2018). Interior decoration of stable metal–organic frameworks. *Langmuir*, *34*(46), 13795-13807.

Long, J. W., & Rolison, D. R. (2007). Architectural design, interior decoration, and three-dimensional plumbing en route to multifunctional nanoarchitectures. *Accounts of chemical research*, *40*(9), 854-862.

Wu, Z., Li, H., Feng, Y., Luo, X., & Chen, Q. (2019). Developing a green building evaluation standard for interior decoration: A case study of China. *Building and Environment*, *152*, 50-58.

h). Manufacturing Technology (Area of Specialization)

Course Title: Introduction to Engineering Materials

Course Code: BSTE 436

Course description

This course describes about the various engineering materials used to manufacture different engineering products. It will describe the classification, properties, and specific applications of various engineering materials.

- **Semester**: VII
- **Credit Hours:** 3+1
- **Pre-requisites:** Basic knowledge of physics and chemistry

Learning Outcomes

Upon successful completion of the course, the students will be able to:

1. Comprehend basic types of engineering materials and their applications.
2. Comprehend the classification, application & characteristics of engineering materials.

Course Contents

Unit-1: Introduction

1.1 Materials Science and Engineering
1.2 Material Selection criteria
1.3 Atomic arrangement of various materials
1.4 Types of Bonding

1.5 Crystal system

1.6 Polymorphism and Allotropy

Unit-2: Engineering Materials Classification, Properties, Resources, Alloys and Applications

2.1 Metallic Materials

2.1.1 Ferrous Materials

2.1.1.1 Carbon Steels

2.1.1.2 Alloys Steel

2.1.2 Non-ferrous Materials

2.1.2.1 Aluminum

2.1.2.2 Copper

2.1.2.3 Magnesium

2.1.2.4 Titanium

2.1.2.5 Gold

2.1.2.6 Silver

2.1.2.7 Lead

2.1.2.8 Zinc

2.1.2.9 Tungsten

2.1.2.10 Nickel

2.1.2.11 Tin

2.2 Non-metallic Materials

1.1.1 Polymeric materials

1.1.2 Composites

1.1.3 Ceramics and glasses

Teaching-learning Strategies

The teaching and learning strategy have been designed on the understanding of concepts and the ability to critically analyze and apply the learned content through lectures, discussion, activities, case studies using computer, multi-media and writing board instructional aids.

Assignments- Types and Number with calendar

At least 2 Assignments / Quizzes / Presentation will be submitted before the written exam of final term

Assessment and Examinations Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written or MCQ-based* examination at the mid-point of the semester.
2.	Formative Assessment	25%	It includes classroom participation, attendance, class presentations and assignments.
3.	Final Assessment	40%	Written examination at the end of semester.

Textbooks

1. W. D. Callister, “Materials Science and Engineering: An Introduction”, John Wiley and Sons, 8th Edition (2009).
2. W.F. Smith, “Principles of Materials Science Engineering”, McGraw Hill, (2005).

Recommended Books

3. S. H. Avner, “Introduction to Physical Metallurgy”, Tata McGraw-Hill, Inc., (1997).
4. F.Cardarelli, “Materials Handbook”, Springer (2000).
5. J.J. Moore, “Chemical Metallurgy”, Butterworth-Heinemann (1990).
6. C. B. Gill, "Nonferrous Extractive Metallurgy", Krieger Pub Co. (1988).
7. N. Sevryukov, B. Kuzmin and Y. Chelishchev, "General metallurgy", MIR Publishers (1969).
8. H. S. Ray, R. Sridhar and K. P. Abraham, “Extraction of Non-Ferrous Metals”, Affiliated East-west Press (1987).

Course Title: **Foundry Technology**

Course Code: BSTE 437

Course description

This course describes about the various molding and casting techniques. It describes melting and solidification of cast iron, steel, aluminum, and copper alloys.

- **Semester:** VII
- **Credit hours:** 4
- **Theory Credit Hours:** 3 per week
- **Lab Credit Hours:** 1 per week
- **Lab contact hours:** 3 per week
- **Pre-requisites course:** Basic knowledge of Chemistry

- **Learning Outcomes:**

Upon successful completion of the course, the students will be able to:

1. Comprehend the functions of various raw materials, patterns and cores for molding process.
2. Explain various casting manufacturing routes, machines in foundry and related defects.
3. Metal casting: a process of shaping
4. Comparison of casting method with other shaping techniques
5. Classification of foundries
6. Functions of patterns
7. Types of patterns
8. Pattern Materials and allowances.
9. Mold & core sands (types, properties & ingredients)
10. Binders and additives
11. Comprehend solidification phenomenon of pure metals and alloys.
12. Explain manufacturing routes of various metals, alloys, and related metal treatment processes.
13. Calculate most favorable rating system for a particular casting.

Course Content

Unit-1: Sand Molding

1.1 Sand molding (Green sand, Shell, Cement bonded, CO2 process, Risen bonded, Molasses molding etc.).
1.2 Casting (pressure and gravity die castings)
1.3 Centrifugal casting. Investment casting
1.4 Core boxes and core making
1.5 Molding equipment

1.6 Removal of gating system (equipment & machines rough cleaning including flogging, mechanical cut off, torch cutting

1.7 Surface cleaning – exterior and interior (equipment and machines) including tumbling, blasting and other types of surface cleaning

1.8 Inspections of casting including visual, dimensional, and metallurgical procedures.

1.9 Different designs and operational procedure of a foundry Cupola, Induction furnace, Rotary furnace

Unit-2: Casting and Solidification of metals

2.1 Introduction
2.2 Phase transformation
2.3 Freezing of a pure metal
2.4 Solidification in a mold (Dendritic solidification)
2.5 Charge calculations of various alloys
2.6 Solidification phenomenon (Nucleation & Growth process)
2.7 Family of cast irons their solidification and manufacturing
2.8 Effects of alloying elements in cast irons
2.9 Primary functions of riser
2.10 Characteristics of pouring cups, sprue, runners and ingates, Gating ratio
2.11 Al-based, Cu-based, and other foundry alloys
2.12 Degasification and modification
2.13 Treatment with cover and cleaning fluxes
2.14 Occurrence and appearance of various casting defects
2.15 Non-metallic inclusions for common foundry alloys and defects due to improper gating design

Lab Outline: Practical pertaining to above mentioned course outlines.

Teaching-learning Strategies

The teaching and learning strategy has been designed on the understanding of concepts and the ability to critically analyze and apply the learned content through lectures, discussion, activities, case studies using computer, multi-media and writing board instructional aids.

Assignments- Types and Number with calendar

Assignments / Quizzes / Presentation / Open Ended Lab / Complex Engineering Problems (min. 2) will be submitted before the written exam of final term

Assessment and Examinations Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written or MCQ-based* examination at the mid-point of the semester.
2.	Formative Assessment	25%	It includes classroom participation, attendance, class presentations and assignments.
3.	Final Assessment	40%	Written examination at the end of semester.

Textbook:

1. R. W. Heine, C. R. Loper and P.C. Rosenthal, “Principles of Metal Casting”, Tata McGraw-Hill, Inc. (2014).

Suggested Readings

2. J. Campbell, “Castings”, Butterworth-Heinemann (2003).
3. N. K. Srinivisan, “Foundry Engineering”, Khanna Tech. Publications India (1991).
4. R. A. Flinn, “Fundamentals of Metal Casting”, Addison Wesley Inc. (1983).
5. J. R. Brown, “The Foseco Non-Ferrous Foundryman’s Handbook”, Butterworth-Heinemann, (1999).
6. P. Beeley, “Foundry Technology”, Butterworth-Heinemann (2001).

Course Title: **Metallurgical Manufacturing Technology**

Course Code: BSTE 438

- **Semester: VII**
- **Credit hours:** 3 +1

- **Pre-requisites course:** Basic knowledge of Chemistry, Workshop Technology

Learning Outcomes:

Upon successful completion of the course, the students will be able to:

1. Comprehend fundamentals of different manufacturing processes,
2. Select a suitable manufacturing process to produce a given component.

Course Outline

1.1 Introduction to Shaping Processes and Classification.
1.2 Fundamentals of metal working.
1.3 Cold and Hot Working of Metals.
1.4 Hot forming processes; Forging
  1.4.1 Open die hammer forging
  1.4.2 Die drop forging
  1.4.3 Press forging
  1.4.4 Upset forging
  1.4.5 Roll forging
  1.4.6 Near net shape forging
1.5 Cold working processes
  1.5.1 Squeezing
  1.5.2 Bending
  1.5.3 Shearing
  1.5.4 Wire drawing
  1.5.5 Rolling
  1.5.6 Coining
  1.5.7 Peening
  1.5.8 Burnishing
  1.5.9 Thread rolling
  1.5.10 Angle bending
  1.5.11 Roll bending
  1.5.12 Roll forming
  1.5.13 Straightening
  1.5.14 Shearing
  1.5.15 Blanking
  1.5.16 Perforating
  1.5.17 Notching
  1.5.18 Nibbling

1.5.19 Shaving

1.5.20 Trimming

1.6 Extrusion & its methods

1.7 Embossing & Stretch forming

1.8 Sheet metal forming process

1.9 Rolling of ingot, bloom, billets, sheet, bars, rods and structural components

1.10 Manufacturing defects causes and remedies

1.11 Quality control in manufacturing processes

1.12 Powder Manufacturing Technology

1.13 Types of machine tools and machining processes

1.14 Plastic Injection Molding

1.15 Plastic blow molding

1.16 Introduction to 3D Printers Manufacturing Technology

1.17 Introduction to Nano Manufacturing Technology

Teaching-learning Strategies

The teaching and learning strategies have been designed on the understanding of concepts and the ability to critically analyse and apply the learned content through lectures, discussion, activities, case studies using computer, multi-media and writing board instructional aids.

Assignments- Types and Number with calendar

Assignments / Quizzes / Presentation / Complex Engineering Problems will be submitted before the written exam of final term

Assessment and Examinations Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written or MCQ-based* examination at the mid-point of the semester.
2.	Formative Assessment	25%	It includes classroom participation, attendance, class presentations and assignments.
3.	Final Assessment	40%	Written examination at the end of semester.

Textbooks

1. M. P. Groover, “Fundamentals of Modern Manufacturing: Materials, Processes, and Systems”, John Wiley & Sons, Inc. (2007).

Suggested Readings

2. S. Kalpakjian et.al “Manufacturing Processes for Engineering Materials”, Pearson Education, Inc., (2003).
3. B. H. Amstead, P. F. Ostwald and M. L. Begeman, "Manufacturing Processes", John Wiley & Sons, (1987).

4. R. C. Creese, “Introduction to Manufacturing Processes and Materials”, Taylor and Francis, (1999).
5. E. P. DeGarmo, J. T. Black et.al "Materials and Processes in Manufacturing", Wiley (2002).
6. H. Geng, “Manufacturing Engineering Handbook”, McGraw-Hill (2004).

Course Title: **Metal Joining and Heat treatment Technologies**

Course Code: BSTE 439

Course description

This course describes about the various metal joining processes to fabricate various engineering products. It also describes various heat treatment processes applied to steel to produce various engineering products.

- **Semester:** VII
- **Credit hours:** 3+1
- **Pre-requisites course:** Basic knowledge of Chemistry

Learning Outcomes:

Upon successful completion of the course, the students will be able to:

1. Comprehend various metal joining processes of engineering materials.
2. Apply the knowledge of various heat treatment processes to develop required microstructures.
3. Types and applications of various heat-treatment (HT) processes.

Course Contents

Unit-1: Metal Joining Processes

1.1 Weld Technology

1.1.1 Arc Welding

1.1.2 Pressure gas welding

1.1.3 Types of welding joints & their preparation

1.1.4 Types of welding defects and imperfections

1.2 Brazing Technology

1.3 Soldering Technology

1.4 Rivet bonding

Unit-2: Heat treatment Processes

2.1 Introduction

2.2 Annealing and its types

2.3 Quenching

2.4 Tempering

2.5 Martempering

2.6 Types of Carburizing (Pack, Gas & Liquid carburizing)

Lab Outline: Practical pertinent to above mentioned course.

Lab Outline: Practical training of few joining processes with special attention to weld joint preparation, inspection and mechanical testing. Technical lectures should also be given on inspection and testing in lab.

The student will perform various heat treatment processes in the laboratory

Teaching-learning Strategies

The teaching and learning strategies have been designed on the understanding of concepts and the ability to critically analyse and apply the learned content through lectures, discussion, activities, case studies using computer, multi-media and writing board instructional aids.

Assignments- Types and Number with calendar

Assignments / Quizzes / Presentation / Open Ended Lab / Complex Engineering (min. 2) will be submitted before the written exam of final term.

Assessment and Examinations	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written or MCQ-based* examination at the mid-point of the semester.
2.	Formative Assessment	25%	It includes classroom participation, attendance, class presentations and assignments.
3.	Final Assessment	40%	Written examination at the end of semester.

Textbooks

1. H. B. Cary and S. C. Helzer, "Modern Welding Technology", Prentice Hall (2004).
2. A. D. Althouse, C. H. Turnquist et.al, "Modern Welding", Goodheart Wilcox Company (2000).

Suggested Readings

3. A. Pytel, F. L. Singer, “Strength of Materials”, Harper & Row Publishers, NY, USA.
4. K. Easterling, “Introduction to the Physical Metallurgy of Welding”, Butterworth-Heinemann (2000)
5. J. F. Lancaster, “Metallurgy of Welding”, William Andrew (1999).
6. 1. R. W. K. Honeycombe et al. “Steels: Microstructure and Properties”, Butterworth-Heinemann, (2006).
7. G. E. Totten, "Steel Heat Treatment: Metallurgy and Technologies", CRC Press (2006).
8. J. W. Christian, “The Theory of Transformations in Metals and Alloys”, Pergamon (2002).
9. D. A. Porter et al. “Phase Transformations in Metals and Alloys”, Chapman and Hall (2001).
10. R. E. Smallman et al. "Modern Physical Metallurgy and Materials Engineering", Butterworth-Heinemann (1999).

i). Glass, Ceramics and Pottery (Area of Specialization)

Title of Course: GLASS TECHNOLOGY

Course Code: BSTE 441

- Semester: VII
- Credit Hours: 3+1
- Pre-requisites course requirements/ skills NA

Course Description

The aim of this course is to give comprehensive knowledge to the students regarding typical raw materials used and their availability in Pakistan. Also, it provides information about typical composition of glass and effect of various oxides there on. This course also gives information regarding batch calculations and steps involved during glass preparation.

Course Objectives

The objectives of this course are to:

- introduce students to the types of ceramic materials.
- familiarize the student with bonding mechanisms of ceramic materials, structure, and bonding mechanism of ceramic materials.
- explain the characteristics of vitreous and crystalline inorganic non-metals.
- explain the application and discuss the effects of microstructure on thermal, mechanical, optical electrical and magnetic properties of ceramic products; and
- familiarize them with manufacturing techniques for various ceramic products

Learning Outcomes

- explain the basic rules of glass formation, chemical composition of glass and effects of atoms in engineering sciences.
- determine the basic rules of glass formation and the process steps.
- describe the relationship between glass structure and properties
- describes major glass structures.
- investigate the relationships between glass formers, conditional glass formers and modifiers, determine their amounts on the glass structure.
- determines major glass formers and glass structures.
- determines the different properties of glasses belong to those systems.
- evaluate the relationships between chemical composition, structure, and properties of glass.

Course content

1. Feldspar

1.1 Explain the kind of Feldspar and the effect of heat, use as flux, oxide obtained from feldspar, use of feldspar in glass composition, availability of feldspar in Pakistan.

2. Glass Sand

Describe the oxide obtained from the silica sand.

Describe the amount which can be used in glass composition

Describe the impurities present in glass sand and their effect on glass

Explain the sources of glass sand in Pakistan

Describe various form of silica

3-limstone

Define Limestone

Name the Oxide obtained from Limestone and its effect on the melting of Glass

Availability of Limestone in Pakistan w.r.t Glass Industry

4- Dolomite

What is Dolomite?

Availability of Dolomite Stone in Pakistan w.r.t Glass Industry

Why Used in glass?

Explain the calcinations and double carbonate.

5- **Cryolite**

What is Cryolite?

Sources of Cryolite

Availability in Pakistan

6- Red Lead

Source of PbO

Availability Source of PbO

Use of Lead Silicate

Eeffect of PbO on glass melting and its properties.

7- Quartz

Properties of Quartz mineral.

Availability of Quartz in Pakistan

Effect of Quartz in glass and the properties of glass

8- Soda Ash

Differentiate between Soda and Soda Ash

Sources of Soda

Explain effect of melting and the other properties of Glass

9- Potassium Carbonate

Main source of K2O.

Manufacturing of Potassium carbonate

Impurities present in the salt

Effect of Potash on the properties of glass

10- Potassium nitrate and Hydroxide

Sources of Potash

Manufacturing of the salts.

Impurities present in the salt

Effect of Potash on the properties of glass

11- Barium Compound

Compound

Source of BaO

Preparation of carbonate from sulfate.

Use of BaSO4 as BaO

Effect of BaO on the properties of Glass

12- **Phosphate Compound**

Various phosphate compounds

13- Zirconium Compound

Use of Zirconia in glass

Effect on melting and properties of glass

14- Calumite

What is Calamite?

Glass, Ceramics & Pottery Development

Use in glass and its effects

15- Decolorizer

Various decolorizer used in glass batch

16- Refining Agent

Define Refining Agent

Chemistry of Refining Agent

Various oxide used as refining agents

17- Cullet

What is Cullet?

Factory and Foreign cullet
Use in glass batch

Teaching-learning Strategies

Besides the formal introductory lectures on the topics mentioned above each graduate student will complete assignment related to graphic representation of mechanical engineering objects.

Assignments

Assignments will be given with a combination of mini tasks, projects, and presentations related to mechanical engineering.

Assessment and Examinations

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.

3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.	Assessment will be done

e based on assignments, mid semester, and final semester Test. Detail is given b

Textbook

- Callister, W. D., Rethwisch, D. G., Blicblau, A., Bruggeman, K., Cortie, M., Long, J., ... & Orwa, J. (2021). *Materials science and engineering: an introduction*.

Suggested Readings

- Callister Jr, W. D., & Rethwisch, D. G. (2020). *Callister's materials science and engineering*. John Wiley & Sons.
- Callister Jr, W. D., & Rethwisch, D. G. (2020). *Fundamentals of materials science and engineering: an integrated approach*. John Wiley & Sons.

COURSE TITLE: CERAMIC PRODUCTION TECHNIQUES

Course Code: BSTE 442

- Semester: VII
- Credit Hours: 3+1
- Pre-requisites course requirements/ skills NA

COURSE DISCRIPTION

The course is designed to make learners able to apply the principles of ceramic manufacturing to the commercial production of ceramic products in the industries and develop a natural relationship between the theory and the practice

Course Objectives

- The objectives of this course are to:
- introduce students to the types of ceramic materials.
- familiarize the student with bonding mechanisms of ceramic materials, structure, and bonding mechanism of ceramic materials.
- explain the characteristics of vitreous and crystalline inorganic non-metals.
- explain the application and discuss the effects of microstructure on thermal, mechanical, optical electrical and magnetic properties of ceramic products; and
- familiarize them with manufacturing techniques for various ceramic products

Student Learning Outcomes:

At the conclusion of this course students should be able to demonstrate the following:

- knowledge of the world art history of ceramics
- knowledge of contemporary ceramics in the United States
- the ability to successfully manipulate clay through the basic hand building techniques of coil, pinch, and slab
- the ability to successfully manipulate clay on the potter's wheel
- the ability to embellish the surface in an expressive and meaningful way using slips and glazes
- the ability to safely load and unload ceramic objects in both electric and gas kilns
- the ability to discuss, in an articulate, thoughtful manner during class critiques, the meaning, design, and
- technical processes used to create ceramic art objects

COURSE CONTENTS

1. SLIP CASTING

Explain the Properties of aqueous suspensions

Explain the Normal casting processes

Define and Explain the Solid casting

Define and Explain the Pressure casting

Explain the Deflocculant, its types & behavior, viscosity & thixotropy

2. PRESSING

Define and Explain the Simple presses

Define and Explain the Hydraulic presses

Define and Explain the Dry pressing

Define and Explain the Binders in pressing & their properties

Define and Explain the Iso-static pressing

Define and Explain the HIP pressing

2. THROWING

Describe the Effect of water on bodies for throwing

Describe the Pugmill & its effects on throwing bodies

3. JIGGERING

Define and explain the Jiggering

Explain the types of jiggering

4. JOLLEYING

Define and explain the Jollying

Explain the types of Jollying

5. SINTERING

Describe the Various methods of sintering

Describe the New techniques of sintering

Describe the Sintering of Al2O3 & MgO

6. DRYING & FINISHING

Explain the Mechanism of Drying

Define and Explain the Bulk drying

Explain the Dryers and types

Explain the Finishing techniques

7. DEFINE AND DESCRIBE THE INJECTION MOULDING TECHNIQUES

LIST OF PRACTICALS

1. Study the theory and operation of filter press i.e., Filtering, washing cleaning of press by filtering various industrially important slurries.

2. Determinations of flash point and fire point.

3. Determination of Viscosity by Ostwald's Viscometer.
4. Determination of viscosity by red wood viscometer.
5. Making and pressing of tiles i.e., Wall Tiles and Floor tiles by various types of Presses e.g. Friction Press, Toggle Press and Hydraulic Press.

6. Fabrication of refractory furniture for the use in Kilns.

Teaching-learning Strategies

Besides the formal introductory lectures on the topics mentioned above each graduate student will complete assignment related to graphic representation of mechanical engineering objects.

Assignments

Assignments will be given with a combination of mini tasks, projects, and presentations related to mechanical engineering.

- **Assessment and Examinations**

Assessment will be done based on assignments, mid semester, and final semester

Test. Detail is given below.

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes: classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Textbook

1. Kingery, W. D. (1958). Ceramic fabrication processes.

Suggested Reading

Kingery, W. D., Bowen, H. K., & Uhlmann, D. R. (1976). *Introduction to ceramics* (Vol. 17). John Wiley & sons. London

Title of Course: PROPERTIES OF GLASS AND CERAMICS MATERIALS

Course Code: BSTE 443

Course Description

The students will be able to learn the characteristic properties of Glass and Ceramic Materials and apply this knowledge to comprehend and solve practical problems encountered during production process

- Semester: VIII
- Credit Hours: 3+1
- Pre-requisites course requirements/ skills NA

Course Objectives

The objectives of this course are to:

- introduce students to the types of ceramic materials.
- familiarize the student with bonding mechanisms of ceramic materials, structure, and bonding mechanism of ceramic materials.
- explain the characteristics of vitreous and crystalline inorganic non-metals.
- explain the application and discuss the effects of microstructure on thermal, mechanical, optical electrical and magnetic properties of ceramic products; and
- familiarize them with manufacturing techniques for various ceramic products

Course outcomes

- The objectives of this course are to:
- introduce students to the types of ceramic materials.
- familiarize the student with bonding mechanisms of ceramic materials, structure, and bonding mechanism of ceramic materials.
- explain the characteristics of vitreous and crystalline inorganic non-metals.
- explain the application and discuss the effects of microstructure on thermal, mechanical, optical electrical and magnetic properties of ceramic products; and
- familiarize them with manufacturing techniques for various ceramic products

COURSE CONTENTS

1. MECHANICAL PROPERTIES OF MATERIALS

Understand Elastic Deformation
Define Stress and strain
Explain Tensile and compressive deformations
Describe Sheer stress strain
Discuss Poison's Ration
Understand Elastic Moduli
Develop Rotation between cohesive energy and melting point
Discuss Effect of temperature

Explain Anelasticity

1.3 Understand Plastic Deformation

Explain the role of Simple oxides
Describe the process of Dislocation in slip
Discuss Creep
Illustrate the Effect of temperature
Understand Polyphase Materials
Describe Mechanism
Influence of temperature
Understand Brittle Fracture
Describe Fracture Mechanism
Describe Fracture Energy
Explain Theoretical Strength of Ionic solids
Describe the Flaws, their origins and role
Understand Fracture in single and polyphase materials
Understand Strength and strengthening of glass
Describe the Flaws
Describe the Influence of flaw size on the strength
Explain the Methods of strengthening
Understand Hardness and Abrasion
Explain the Relationship with other properties
Describe Elastic modules
Discuss Creep
Explain Flow strength and phase assemblage
Describe Abrasions

2. THERMAL PROPERTIES

Understand Specific Heat
Explain the effect of common ceramic material Effect of temperature
Define Latent heat of fusion
Define Fusion point
Describe Melting point
Understand Thermal Expansion
Describe the Simple ionic crystals: Thermal expansion in

relation to potential energy curve, effect of phase transformation
Glass: Thermal expansion curve and its significance.
Thermal expansion, composition, and structure of Glass
Polycrystalline materials: Relationship with composition and microstructure
Understand Thermal Conductivity
Describe the thermal conductivity in Simple oxides: Relationship with other properties
Describe the effect of Polycrystalline materials: Effect of microstructure porosity and Insulation
Explain Thermal endurance of glasses w.r.t. composition

Understand Thermal Stress

a) Describe the formation of Stress in Glass: Permanent and temporary stress, Annealing and tempering

b) Define Thermal shock resistance of Glass

c) Explain Spalling of Ceramics: Effect of Moisture, Effect of shape

d) Describe the Stress at interfaces: Glazes, Enamels and glass to metal seals, micro-stress in relation to micro- structure

3. OPTICAL PROPERTIES

Understand the Reflection and Refection

Define Refractive index and dispersion: Effect of composition, polarizability, density and temperature

Describe the Reflection in relation to surface texture: Specular reflection and diffused reflection, from glazed surfaces. Reduction of reflection loss

Define Scattering and opacity: Opacity in relation to refractive index, particle size, pore size, opal glass and glazes. Transparent and translucent ceramic materials

Understand Absorption of Radiation

Understand Ionic colour in vitreous system: Absorption spectrum of transition metal

Describe ions in U.V., Visible and I.R. regions, oxidation reduction equilibria effect of composition and structure

Describe the behavior of Colloidal colors: Carbon-surplus, amber glass, se-ruby

Explain U.V. and I.R absorption: Factors influencing I.R. and

U.V. absorption

Define Fluorescence

Understand Polarization and Birefringence

Define polarization, discuss the Crystals: Polariser-Analyser, Tinplate, Mineralogical microscope

Describe the behavior of Polycrystalline material under a microscope: Microstructures in transmitted and reflected light

Describe the Strain in glass: Strain and polarization of light, measurement of strain in glass, strain discs

Understand Microstructure

Mineralogical Microscope

Preparation of Specimens

Microstructure of typical ceramics materials

Electron Microscope

4. CHEMICAL PROPERTIES

Understand Surface Chemistry of Vitreous Materials

Explain the Attack of water, Alkali and Acids: Reaction process and reaction rates

Describe the Effect of composition, weathering of glass surface. Alkali resistance, ion exchange

Discuss Electrode Glasses: Hydrogen and metal ion- electrode

Explain the Durability of Glazes and enamels: Effects of composition, effect of

Explain the Electrical stress in insulator glaze

Define the Devitrification and phase separation
Understand Chemical Attack on Refractories
Describe the effect of Slags and glasses
Describe the effect of Molten Metals
Describe the effect of Glasses
Aqueous Solution

5. ELECTRICAL PROPERTIES

Understand Conduction
Define Ionic Conduction: conduction in crystals and polycrystalline ceramics, conduction in glasses, effect of composition and structures
Describe Electronic Condition: Band structure and transport, conduction in crystals and polycrystalline ceramics, semi- conducting glasses.
Understand Dielectric Properties
Define Di-electric constant and Di-electric loss: polarization and Di-electric
Explain Phenomena, effect of temperature and frequency.
Di-electric behavior of
Describe the Poly crystalline ceramics. Dielectric behavior of glasses in relation to
Describe the effect of Composition and structure
Describe the Die-electric strength
Describe the factors which effect the die-electric of Insulators
Describe the Ferro-electric phenomena: Ferro-electric behavior of ceramics in relation to structure
Explain the Piezo-electric ceramics. Electro-optic phenomena in ceramics

6. MAGNETIC PROPERTIES

Para magnetism: Paramagnetic properties of crystalline and glass materials containing transition metal ions. Effect of valency and coordination numbers.
Ferromagnetism: Elementary theory, Hysteresis, Curie point,
Ferromagnetism
Ferromagnetic Ceramics: Spinals, Hexagonal Ferrites, Garnets,
Ferromagnetic behavior in relation to structure, soft ferrites, Hard
Ferities, and square loop Hysteresis ferities.

7. PHYSICAL PROPERTIES

Relations of Glass composition to:
Density and Specific Gravity
Viscosity
Surface Tension
Softening point
Annealing point etc.

Assessment and Examinations

Sr. No.	Elements	Weightage	Details

1. Midterm Assessment	35%	It takes place at the mid-point of the semester.
2. Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3. Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Books Recommended:

- Holand, W., & Beall, G. H. (2019). *Glass-ceramic technology*. John Wiley & Sons.

Suggested Readings

- Bach, H., & Krause, D. (Eds.). (2013). *Analysis of the composition and structure of glass and glass ceramics*. Springer Science & Business Media.
- Erol, M., Küçükbayrak, S., & Ersoy-Mericboyu, A. (2008). Comparison of the properties of glass, glass–ceramic and ceramic materials produced from coal fly ash. *Journal of Hazardous Materials*, *153*(1-2), 418-425.

Title of Course: SANITARY WARES & TILES

Course Code: BSTE 444

Course Description

This course will provide an opportunity for learners to establish or advance their understanding to various bodies of tile and sanitary wares which is the most profitable ceramic industry of the county

- **Semester: VIII**
- **Credit Hours:3+1**
- **Pre-requisites course requirements/ skills NA**

Course objectives

- introduce students to the types of ceramic materials.
- familiarize the student with bonding mechanisms of ceramic materials, structure, and bonding mechanism of ceramic materials.
- explain the characteristics of vitreous and crystalline inorganic non-metals.
- explain the application and discuss the effects of microstructure on thermal, mechanical, optical electrical and magnetic properties of ceramic products; and
- familiarize them with manufacturing techniques for various ceramic products

Learning Outcomes

After successful completion of this course the students will be able to.

- explain the basic rules of glass formation, chemical composition of glass and effects of atoms in engineering sciences.
- determine the basic rules of glass formation and the process steps.
- Discusses the relationship between glass structure and properties and describes major glass structures.
- investigate the relationships between glass formers, conditional glass formers and modifiers, determine their amounts on the glass structure.
- Determines major glass formers and glass structures.
- Investigates different glass systems depending upon the type of glass formers.
- Determines the different properties of glasses belong to those systems.
- evaluate the relationships between chemical composition, structure, and properties of glass.

COURSE CONTENTS

UNIT-1

1. TILE RAW MATERIALS
Talc as tile raw material
Clay as tile raw material
Quartz as tile raw material
Describe Feldspar as tile raw material
2. TILE BODY
Grinding of Talc
Mixing of Clay, Quartz and Feldspar

Pulverizing of Moisture in body Composition
Granulation of the body materials
3 MANUFACTURING PROCESSES
Pressing by toggle, Hydraulic and Screw, etc.
Finishing
Glazing
Firing
4 SANITARY WARES – RAW MATERIALS
Clay as tile raw material
Quartz as tile raw material
Feldspar as tile raw material
5 FORMING OF SANITARY WARES

Solid casting of sanitary wares
Finishing of sanitary wares
Glazing of sanitary wares
Firing of sanitary wares

Teaching-learning Strategies

Besides the formal introductory lectures on the topics mentioned above each graduate student will complete assignment related to graphic representation of mechanical engineering objects.

Assignments

Assignments will be given with a combination of mini tasks, projects, and presentations related to mechanical engineering.

Assessment and Examinations

Assessment will be done based on assignments, mid semester, and final semester Test.

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final ssessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Textbook

- Singer, F., & Singer, S. (1966). Industrial Ceramics, 3rd Band-The Ceramic Products.

Suggested Reading

- Singer, F. (2013). *Industrial ceramics*. Springer.

j. Solar Power Technology (Area of Specialization)

Course Name: Solar Thermal Energy

Course code: 450

Course Description

This course teaches students the fundamentals of solar thermal energy systems, including system performance, concentrating versus non-concentrating systems, thermal fluids, markets for solar thermal energy, and applications in a range of relevant fields, such as district heating and cooling, industrial process heating, solar desalination, and materials processing. The course contains 12 lessons, which are taught over 15 weeks. The course activities include online class discussions, quizzes, individual work on assignments, peer feedback, and development of design proposal as the final deliverable

- **Semester:**
- **Credit Hours:**
- **Pre-requisites course requirements/ skills: Course Electricity must be completed.**

Objective

After this course, the student will:

- articulate the technical and economic fundamentals of solar thermal energy conversion useful to society and industry.
- describe the spectrum of possible solar thermal technologies to assist industrial processing or power production.
- distinguish the regional technical and economic obstacles to solar thermal deployment.
- assess solar thermal technologies to identify the greatest solar utility for a client in each locale

Learning outcomes:

On successful completion of the course students will be able to:

- explain the technical and physical principles of solar cells and solar collectors,
- measure and evaluate different solar energy technologies through knowledge of the physical function of the devices,
- calculate the required size of solar cell systems and solar collectors from a given power need by using appropriate software,
- make critical comparisons of different solar energy systems,
- communicate technological, environmental, and socio-economic issues around solar energy in a concise and accessible way to a target group with basic technical skills

Course Content.

The course covers six thematic areas:

Unit-1 Solar radiation:

- Properties of sunlight.
- Absorption by the atmosphere.
- Calculation of solar irradiance at surfaces.

Unit-2 Solar cells and modules:

- The function of solar cells from semiconductor physics.
- Different solar cell technologies and fabrication methods.
- Concepts for increasing efficiency based on loss analysis.
- Wavelength sensitivity.
- Series connection of solar cells to modules.
- Module function and characteristics.
- Shading of cells and modules.

Unit-3 Solar cell systems:

- System components and their functions.
- Calculating output and dimensioning of solar cell systems.
- Analysis and computer simulation of a solar cell system.
- Concentrated sunlight and solar power (CSP).
- Properties of optical concentration systems.
- Solar cells in concentrated sunlight.
- Overview of the different components in a CSP system and their functions.

Unit-4 Solar thermal:

- Thermodynamic description of solar collectors.
- Optical properties of solar collectors and technologies for fabrication.
- Solar thermal systems for different applications in Sweden and abroad.
- Storage of solar-generated heat.

Unit-5 Hybrid systems:

- Combinations of solar thermal and solar cell systems.

- Overview of different applications.
- District heating with solar thermal components.

Unit-6 Active solar energy in systems:

- How large-scale deployment of active solar energy is possible in Sweden and globally.
- Buying and selling heat and electric energy.
- Grid aspects of large-scale deployment of solar cells as well as environmental and socioeconomic aspects.

- **Assessment and Examinations**:
  Assessment will be done as per university/department policy.

Sr. No.	Elements	Weightage	Details
4.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
5.	Formative Assessment	25%	It is a continuous assessment. It includes classroom participation, attendance, assignments, and presentations, homework, attitude and behavior, hands-on activities, short tests, quizzes, etc.
6.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on a term paper, research proposal development, fieldwork, and report writing, etc.

Textbook:

- John A. Duffie and William A. Beckman, " *Solar Engineering of Thermal Processes*," John Wiley and Sons, Inc., ISBN 978-0-470-87366-3 (2013).

Reference Books:

- Glassley, W. E. (2014). *Geothermal energy: renewable energy and the environment*. CRC press.
- DiPippo, R. (2012). *Geothermal power plants: principles, applications, case studies and environmental impact*. Butterworth-Heinemann.

- Tester, J. W., Anderson, B. J., Batchelor, A. S., Blackwell, D. D., DiPippo, R., Drake, E. M., ... & Veatch, R. J. (2006). The future of geothermal energy. *Massachusetts Institute of Technology*, *358*.
- Zoback, M. D. (2010). *Reservoir geomechanics*. Cambridge university press.

Course Name: **Solar Photovoltaic Systems**

Course code: 451

Course description

Solar Photovoltaic technology is used for the direct conversion of sunlight to electricity with advantages of the low gestation period, ease of installation, modular nature, and minimum maintenance. The course is focused on the techno-economics of power generation through solar PV technology. The course starts with the essence of solar PV power generation policies. It is followed by various aspects of system specification, design, project implementation, and operation & maintenance. The course offers a blend of technical expertise required for the design and operation of a solar PV power plant and the understanding of the management aspects required to implement and commission a PV power plant. It also covers the economic analysis of a PV project and its environmental benefits

Semester:

- **Credit Hours:**
- **Pre-requisites course requirements/ skills NA**

The objective of the course is:

- To develop a comprehensive technical understanding of solar PV system components
- To provide an in-depth understanding of design parameters to help design and simulate the performance of a solar PV power plant
- To pertain knowledge about planning, project implementation, and operation of solar PV power generation

Learning outcomes:

After completing this course, a student will be able to: Develop an understanding of the PV plant design and select suitable technologies (Test 2) Design and simulate a PV power plant using software tool (Test 1) Plan project implementation, operation, and maintenance (Test 2, 3 and 4) Carry out techno-economic-environmental performance evaluation of a solar PV power plant (Test 3 and 4)

Course Content.

Solar Radiation:

Sun as Energy Source, Solar Radiation at The Earth's Surface, Solar Radiation Geometry, Solar Time and Equation of Time, Sun-Earth angles, Sun path diagram, Sunshine hours, Measurement of Solar Diffuse, Global and Direct Solar Radiation, Equipment's, Estimation of Solar radiation on horizontal and tilted Surfaces, Global Solar radiation data, Indian Solar Radiation data analysis

Solar Cells

Conversion of Solar energy into Electricity - Photovoltaic Effect, Equivalent Circuit of the Solar Cell, Analysis of PV Cells: Dark and illumination characteristics, Figure of merits of the solar cell, Efficiency limits, Variation of efficiency with bandgap and temperature, Efficiency measurements, High-efficiency cells, Recent developments in Solar Cells, Role of nanotechnology in Solar cells

Fabrication Technology for Solar Cells

High-efficiency multi-junction solar cell, Quantum well solar cell, Technology for the fabrication of thin-film cells, Optical concentration, Effect of temperature on Cell performance, Thermo photovoltaic effect

Solar Photovoltaic System Design

Solar cell array system analysis and performance prediction, Shadow analysis: Reliability, Solar cell array design concepts, PV system design, Design process, and optimization: Detailed array design, Voltage regulation, Maximum tracking, Quick sizing method, Array protection. Solar Photo Voltaic System Testing Sun Simulator, Testing and performance assessment of Solar PV generator, Electronic Control and Regulation, Power Conditioning, Converters, and inverter, Concentrating system, System design, and configuration

SPV Power Systems

Centralized and decentralized SPV systems, stand-alone, hybrid and, grid-connected system, System Installation, Operation and Maintenance, Application of PV for lighting, water pumping. Refrigeration, Telecommunication, Cathodic Protection, Solar PV Power Plant-Status-Case Studies, Hybridization Engineering, Hybrid systems, Grid integration. Building Integrated PV Systems, PV market analysis and Economics of SPV systems

- **Assessment and Examinations**:
  Assessment will be done as per university/department policy.

Sr. No.	Elements	Weightage	Details
1	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.

3	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Textbook:

1. Gilbert M. Masters: Renewable and Efficient Electric Power Systems. John Wiley & Sons, 2004

Reference Books:

1. Roger A. Messenger & Jerry Ventre: Photovoltaic Systems Engineering. CRC Press, 2004, 2nded.
2. Solanki: Solar Photovoltaics: Fundamentals, Technologies, and Applications. PHI Learning Pvt Ltd, 2009

Course Name: **Energy Storage Systems**

Course code: 452

Course Description

This course introduces students to energy storage systems and provides a broad understanding and appreciation of the scientific principles that underpin the operation of such systems. The emphasis is on grid-scale (or utility-scale) energy storage as a means of addressing the intermittency of renewable energy components (e.g. solar or wind power systems) of modern electricity networks. Smaller energy storage systems are also discussed for benchmarking and comparisons. Topics covered include electrical, chemical, thermal, mechanical, electrochemical, thermochemical, and thermomechanical energy storage systems as well as grid integration issues.

- **Semester: VI**
- **Credit Hours:**
- **Pre-requisites course requirements/ skills NA**

Course Objectives

- To study details of various energy storage systems along with applications
- Enabling to identify the optimal solutions to a particular energy storage application/utility

Learning outcomes:

On successful completion of the course students will be able to:

1. Discuss the scientific principles underpinning the operation of energy storage systems.

2. Resolve the intermittency of renewable energy sources such as solar and wind by utilizing problem-solving skills in energy storage engineering and grid integration.

3. Work with a team to apply energy storage knowledge to develop and conduct a project.

Course Content.

Chapter 1

- Background
- Electrical Energy Storage
- Chemical Energy Storage
- Thermal Energy Storage
- Mechanical Energy Storage
- Electrochemical Energy Storage
- Thermochemical Energy Storage
- Thermomechanical Energy Storage
- Technology Status and Projected Demand and Cost
- Grid Integration

Chapter 2

Introduction:

The necessity of energy storage, different types of energy storage, mechanical, chemical, electrical,

electrochemical, biological, magnetic, electromagnetic, thermal, comparison of energy storage technologies

Chapter 3

Energy Storage Systems:

Thermal Energy storage, sensible and latent heat, phase change materials, Energy and exergy analysis of thermal energy storage, Electrical Energy storage-super-capacitors, Magnetic Energy storage-Superconducting systems, Mechanical-Pumped hydro, flywheels, and pressurized air energy storage, Chemical-Hydrogen production and storage, Principle of direct energy conversion using fuel cells, thermodynamics of fuel cells, Types of fuel cells, AFC, PEMFC, MCFC, SOFC, Microbial fuel cell, Fuel cell performance, Electrochemical Energy Storage-Battery, primary, secondary and flow batteries,

Chapter 4

Design and Applications of Energy Storage:

Renewable energy storage-Battery sizing and stand-alone applications, stationary (Power Grid application), Small scale application-Portable storage systems and medical devices, Mobile storage Applications- Electric vehicles (EVs), types of EVs, batteries and fuel cells,

future technologies, hybrid systems for energy storage.

- **Assessment and Examinations**:
  Assessment will be done as per university/department policy.

Textbook:
1. Gilbert M. Masters: Renewable and Efficient Electric Power Systems. John Wiley & Sons, 2004
Reference Books:
1. Roger A. Messenger & Jerry Ventre: Photovoltaic Systems Engineering. CRC Press, 2004, 2nded.
2. Solanki: Solar Photovoltaics: Fundamentals, Technologies, and Applications. PHI Learning Pvt Ltd, 2009

Title of Course: **Solar Power Plant Design**

Course Code: BSTE 453

Course description

Solar Photovoltaic technology is used for the direct conversion of sunlight to electricity with advantages of the low gestation period, ease of installation, modular nature, and minimum maintenance. The course is focused on the techno-economics of power generation through solar PV technology. The course starts with the essence of solar PV power generation policies. It is followed by various aspects of system specification, design, project implementation, and operation & maintenance. The course offers a blend of technical expertise required for the design and operation of a solar PV power plant and the understanding of the management aspects required to implement and commission a PV power plant. It also covers the economic analysis of a PV project and its environmental benefits.

- Semester: VIII
- Credit Hours: 3+1
- Pre-requisites course requirements/ skills: Courses Electricity and Electronics

The objective of the course is:

- To develop a comprehensive technical understanding of solar PV system components
- To provide an in-depth understanding of design parameters to help design and simulate the performance of a solar PV power plant
- To pertain knowledge about planning, project implementation, and operation of solar PV power generation

Learning outcomes:

After completing this course, a student will be able to: Develop an understanding of the PV plant design and select suitable technologies (Test 2) Design and simulate a PV power plant using software tool (Test 1) Plan project implementation, operation, and maintenance (Test 2, 3 and 4) Carry out techno-economic-environmental performance evaluation of a solar PV power plant (Test 3 and 4)

COURSE CONTENT

UNIT-I

1 - Types of Solar Power Plant

1.1 Grid Connected Solar Power Plant

1.2 Grid interactive solar power plant

1.3 Net Metering Solar Power Plant

1.4 Off-Grid / Hybrid solar power plant

1.5 Schemes of solar power plant

2 -Selections of the site and shadow analysis

2.1 PV module structure interrow spacing calculation

2.2 Pitch analysis

2.3 Selection of PV module tilt angle

2.4 Near shading object calculation

2.5 Site survey and plant assessment

2.6 Type of solar radiation

2.7 Irradiance assessment and comparison

2.8 Solar Radiation Data

2.9 Sun path Diagram

2.10 Defining the Position of the Sun

2.11 Solar Altitude

2.12 Geometric Effects

2.13Tilting Solar Modules

2.14 Magnetic North & True North

3 Selection of PV module technology

3.1 Introduction

3.2 Crystalline technology

3.3 Thin film technology

3.4 Bi-facial technology

3.5 Comparison between PV module technology

3.6 Comparison between solar power plant energy output

4 - Selection of PV module (cells and BOM) and sizing

4.1 Types Crystalline module cells

4.2 Manufacturing process of PV cells

4.3 Comparison between monocrystalline

4.4 Selection of PV cells

4.5 Selection of front and rear sheet

4.6 Selection of PV module glass

4.7 Selection of EVA sheet, Bus bar, and frame

4.8 Characteristics of a Solar Cell

4.9 Power Characteristics of a Solar Cell

4.10 Fill factor and Equivalent Solar cell Circuit

STC and NOCT

5 - Inverters Selection and Sizing (Grid Connection and Off-Grid)

5.1 Types of solar inverter

5.2 Selection of string /central / off grid inverter

5.3 Selection of power conditioning unit (PCU)

5.4 Sizing of solar inverter for roof top and grid connected projects

5.5 Selection and sizing of string inverter

5.6 Selection and sizing of central inverter

5.5 AC/DC overloading calculation and losses

5.6 Protection requirement of solar inverter

5.7 Passive and active protection

5.8 Anti- islanding protection

5.9 Mounting arrangement of string inverter

5.10 IEC/IEEE /Grid Compliance of inverters

5.11 Grid-Connected Inverters vs. Stand-Alone Inverters

5.12 Inverter Communication and remote monitoring

5.13 Inverter Products for Use in Pakistan

6 -Connection of PV Module (Series and Parallel Circuit)

6.1 Series Circuits

6.2 Parallel Circuits

6.3 Combining Series & Parallel Circuits

6.4 PV module string connection

6.5 Matching the PV Array to The Voltage Specifications of An Inverter

6.6 Matching the PV Array to the Inverter's Current Rating

6.7 Matching the PV Array to the Inverter's Power Rating

7 - Preparation of single line diagram and plant array layout.

7.1 Preparation of rooftop solar power (single line diagram) SLD

7.2 Preparation of Net Metering solar power (single line diagram) SLD

7.3 Preparation utility scale solar power (Ground mounted) SLD

7.4 Rooftop solar power plant layout

7.5 Ground mounted solar power plant layout

7.6 DC SLD /AC SLD

7.7 Protection SLD

7.8 Earthing Layout/ AC /DC cabling Layout

7.9 DC Block sizing layout

7.10 Overall Array Plant Layout

8 -Solar Power Plant String Combiner Box/ ACDB/ MDB/Metering cubical

8.1 Selection and sizing of SCB/SMB

8.2 Selection of Isolator/ fuse

8.3 Selection of Monitoring of SCB/SMB

8.4 Mounting arrangement of SCB/SMB

8.5ACDB Switchgear sizing

8.6 Types of energy meter and selection

9- Solar power plant HT switchgear selection and sizing

9.1 Selection and sizing of inverter duty transformer

9.2 Selection and sizing of HT switchgear

9.3 Selection and sizing of ICOG/ Main switchboard

9.4 Selection and sizing of Aux. transformer

9.5 Aux. Losses calculation

9.10 Inverter duty No-load and load losses calculation

10 - Selection and sizing of AC and DC Cable

10.1 Ampacity calculation of solar cable

10.2 Sizing of solar cable /DC cable

10.3 Sizing of String cable

10.4 Derating factor of cables

10.5 Sizing of AC cable (Inverter to ACDB, ACDB to MDB)

10.6 Sizing of DC cable (Module to SMB, SMB to Inverter)

10.7 Sizing of energy meter /ABT Meter

11 - Selection and sizing of AC /DC Side Earthing

11.1 Types of earthing

11.2 Types of Earthing strip/ ground conductor

11.3 Types of Vertical electrodes

11.4 Sizing of Cross section area of GI strip

11.5 Resistance calculation of GI strip

11.6 Resistance calculation of Pipe electrode

11.7 Solar Plant resistance calculation

12 - Solar Power Plant Substation and switchyard

12.1 Preparation of Protection SLD

12.2 Selection and sizing of Substation

12.3Preparation of ring main and redial feeder SLD

12.4 Selection and sizing of Power transformer

12.4 Selection and sizing of Current transformer

12.5 Selection and sizing of PT/Isolator/Breaker

12.6 Construction of 33KV/132 KV substation

12.7 Construction of four pole structure

12.8 Construction of metering switchyard

12.9 Selection sizing of switchyard earthing

13 -Selection and sizing Lightening Protection (LA)

13.1 Types of Lightening Protection Arrestor

13.2 Lightening protection assessment calculation

13.3 Protection zone calculation of Conventional type LA

13.4 Down conductor cross-section area calculation

13.5 Method of Lightening protection

13.6 Basic Consideration for Protection

13.7 Calculations for Evaluating the Need for Protection

13.8 Calculation of Protective Angles and Zone of Protection for Various Forms of Air Termination

13.9 Selection of lightning protection device

13.10 Selection of ESE type Lightening Protection

13.11 ESE LA down conductor and earthing calculation

13.14 Preparation LA layout

14 - System Losses of Solar Power Plant

14.1 Determining the Size of the DC and AC Cables

14.2 Losses in a Grid-Connected PV System

15 -Solar Power System Yield Performance (Energy Guarantee)

15.1 What Determines the Energy of a System?

15.2 Preliminary Planning

15.3 Calculating the Energy Yield for a PV Grid-Connected System

15.4 Specific Yield

15.5 Performance Ratio

15.6 CUF Calculation

16 - Maintenance and Troubleshooting

16.1 System Maintenance

16.2 Troubleshooting

17 - Costing and Tendering of Solar Power Plant

17.1 Introduction

17.2 Simple Payback

17.3 Life Cycle Costing

18 - Smart Grid/Net Metering

18.1 Smart Grid
18.2 Smart Meters
18.3 PVsyst, Google SketchUp

- **Assessment and Examinations**:

Assessment will be done as per university/department policy.

Sr. No.	Elements	Weightage	Details
7.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
8.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
9.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Textbooks:

Luque, A., & Hegedus, S. (Eds.). (2011). *Handbook of photovoltaic science and engineering*. John Wiley & Sons.

Suggested Readings

Bhattacharyya, R. (2018). Feasibility studies on use of solar thermal energy for electricity production with thermo-electric generators–a case study in India. *International Journal of Renewable Energy and its Commercialization*, *4*(2), 48-60.

Mukerjee, A. K., & Thakur, N. (2011). *Photovoltaic Systems: Analysis and Design*. PHI Learning Pvt. Ltd..

Kishore, V. V. N. (Ed.). (2008). *Renewable energy engineering and technology: a knowledge compendium*. Energy and Resources Institute.

k. Telecommunication Technology (Area of Specialization)

Course Name: TELECOMMUNICATION FUNDAMENTALS

Course Code:455

Course description

This course is designed to understand the telecommunication systems operations in a broad perspective. In view of international nature of the business the students will be informed about the global standardization and regulatory organizations. An overview will be provided on the historic background and evolutionary trends

- Semester: VII
- Credit Hours: 4
- Pre-requisites course requirements/ skills NA

Course Objective

• understanding basic terms and principles of signal processing in telecommunication transmission,

• describing basic principles of the modern digital telecommunications,

• implementing acquired knowledge in professional specialist courses (theoretical and practical),

• understanding basic operation settings for telecommunication systems and equipment.

Course outcomes

1. explain basic physical and technical principles of modern digital telecommunications,

2. describe basic principles of operation in modern digital telecommunication equipment and systems, 3. demonstrate measurements and experiments in laboratory on actual components, devices, equipment, and systems in telecommunications,

4. describe development and implementation methods of telecommunication systems,

5. examine communication equipment for the technical functionality.

course content

1. Historical Background

1.1 Define Telecommunications

1.2 describe various telecommunication systems and their global aspects

1.3 State the important developments in telecommunication sector

1.4 describe the progress of telecommunication services and industry in Pakistan

2. International Co-ordination, Regulation and Standards

2.1 Explain the necessity of International and National regulation and standard, Mention American and European system differences

2.2 State the International and Regional telecom organizations and their functions in respect of technical and operational co-ordination

2.3 State the International Organization concerned with standards for telecommunication equipment production

2.4 Describe the role of World Trade Organization in telecom business

2.5 Indicate the objectives of International Telecom user group (association)

2.6 Mention the International Regional Corporate Networks and their functions

3. National Regulatory Authorities and Service Providers

3.1 Describe the regulatory framework of Telecommunication in Pakistan

3.2 State the functions of the Pakistan Telecom Authority and Frequency Allocation Board

3.3 Name the Public and Private Sector Operating Entities and indicate their respective functions

3.4 Describe the necessity of National Authority for equipment production standard

3.5 Mention functions of standard organization of Pakistan and compare with some important standard organization of other countries

4. Principles of Telecommunication Technology

4.1 Describe the basic formation of the telecommunication link

4.2 Describe the basic transmission characteristics and various types of transmission systems

4.3 State the merits and demerits of transmission by physical lines

4.4 State the advantages and limitations of wireless transmission systems

4.5 Describe operational features of manual, semi-automatic, automatic, electromechanical and electronic exchanges

4.6 State the importance of various types of plans for satisfactory operation of

telecom services

4.7 Describe basic operation of national wide and international subscriber dialing and charging system

Assessment and Examinations
Assessment will be done as per university/department policy.

Sr. No.	Elements	Weightage	Details
1	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

RECOMMENDED BOOKS.

Saadawi, T. N., Ammar, M. H., & El Hakeem, A. (1994). *Fundamentals of telecommunication networks*. Wiley-Interscience.

Obaidat, M. S., & Boudriga, N. A. (2010). *Fundamentals of performance evaluation of computer and telecommunication systems*. John Wiley & Sons.

Pal, B. P. (Ed.). (1992). *Fundamentals of fibre optics in telecommunication and sensor systems*. Bohem press.

Course Name: **MOBILE COMMUNICATIONS**
Course Code:456

Course Description:

This subject covers the development of the wireless network technology from cellular networks to IP wireless networks. The emphasis is on the concepts, infrastructure, and protocols for supporting device and user mobility. The subject also focuses on an assignment that goes into focus on a contemporary technology which a student group must manage to understand, explore, and address with respect to class lessons and feedback to class.

Course Objective:

• understanding the basic principles of mobile communication systems,

• an analysis of mobile communications with the interpretation of the call prints,

• the basic principles of the modern mobile and wireless communication systems,

• understanding the operation of mobile communications systems and their generation divisions

Course Outcomes

1. explain the basic physical and technical settings functioning of mobile communications systems,

2. describe the basic principles of mobile communication system,

3. conduct field experiments and measurements, and measurements in the laboratory on actual components, devices, equipment, and systems,

4. interpret the collected data and measurement results,

5. describe the development and implementation of mobile communication systems,

6. test mobile communication equipment for the technical functionality

Course Content:

1. Mobile Communications
1.1 Describe the basic requirements of mobile communications and earlier developments in this field

1.2 Explain the suitability of wireless system for mobile communication
1.3 Discus the propagation of radio waves in the MF, HF and VHF bands and their merits and demerits
1.4 Describe the basic concept of cellular mobile phone system
1.5 State the objectives of personal communication system
1.6 Describe various types of mobile communication system for land, sea / rivers and the air
1.7 Understand trunked radio system concept and private mobile radio working
1.8 State the requirements of cordless telephone

2. Radio Paging

2.1 Describe the working of radio paging system
2.2 State the uses of paging for private and public services
2.3 Describe the radio propagation problems and their solutions
2.4 State various types of paging receivers
2.5 Discuss the capacity requirements and the methods of coding
2.6 Explain the system architecture and coupling with public telephone systems
2.7 Understand the methods adopted for compactness and economy of power supply

3. Cellular Telephone System

3.1 Discuss the analog and digital cellular telephone
3.2 Describe the cellular telephone operation techniques
3.3 Discuss the salient features of AMP, TACS, and NMT system
3.4 Describe the architecture of GSM system and state the functions of its subsystems
3.5 Discuss the code division multiple access technique and state salient features of IS-95 system

4. Mobile Satellite Communications

4.1 Describe the use of satellite communication for safety of maritime and aeronautical services
4.2 State the objectives and functions of INMARSAT organization
4.3 Explain the salient features of GMDSS
4.4 Draw the diagram of public telephone system operating through satellite in the ships and air craft
4.5 Describe the global mobile telephone systems through satellite operating at lower than Geostationary orbit and polar coverage
4.6 Discuss the advantage and disadvantages of medium and low earth orbit satellite system for mobile communication
4.7 State the names of various global satellite mobile telephone systems and their salient features

List of Practical's

1. Construct a cordless microphone and check its performances
2. Construct a pair of walkie-talkie sets in the citizen band and test its performance
3. Study various types of pagers and write report on their suitability for different persons and locations

4. Visit a pager station installation and write report on the facilities and procedures
5. Study analogue and digital cellular telephone being used in Pakistan and write report on their performance and tariffs
6. Visit a cellular mobile radio base station and write a report on the equipment, antenna system and the coverage
7. Visit a switching center of cellular mobile system and draw the block diagram
8. Visit a GSM cellular mobile installation and write report on various sub-systems
9. Study the mobile set batteries and their charging arrangements
10. Observe the performance of cellular mobile telephone inside buildings and while moving on streets/roads
11. Study cordless telephones working and write report on the facilities and range
12. Visit coastal station facilities of PTCL and write a report
13. Visit a communication center of Police or Oil/Gas/Electric Co. and study the mobile communication working

Assessment and Examinations

Assessment will be done as per university/department policy.

Sr. No.	Elements	Weightage	Details
1	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

RECOMMENDED BOOKS.

- Understanding Telecommunications Networks by Andy R Valdar, The Institution of Engineering and Technology 2nd Edition (2017)
- The Essential Guide to Telecommunication by Annabel Z. Dodd, Prentice Hall (2019)

Course Name: **Cellular Troubleshooting**

Course code: 457

Course Description

Mobile Phone Troubleshooting Course will make the students well versed with the basic components of mobile phones and will make them familiar with Mobile phones' Accessories, Spare Parts, Tools, Instruments, and other Equipment related to GSM/CDMA/WAP and will make them able to diagnose the problems and repair any kind of mobile by using proper and accurate tools and instruments.

- **Semester: VII**
- **Credit Hours:**
- **Pre-requisites course requirements/ skills: Basic Electronics**

Learning outcomes:

Upon completion of this course, you will be able to:

- Identify different types of mobile cell phones
- Recognize potential hazards in the repair of mobile cell phones
- Identify the parts of a mobile cell phone
- Use the correct hardware tools to repair mobile cell phones
- Assembly and disassembly a mobile cell phone
- Identify mobile cell phone faults and solve them.

Course Content.

Mobile Repairing

Syllabus of mobile repairing course is designed in a way it covers each topic that is necessary for repairing and servicing mobile phones. The course can be divided into four major categories:

1. Basic of Mobile Repairing and Basic Electronics
2. Hardware Repairing
3. Software Repairing
4. Basic and Advanced Troubleshooting

Mobile Repairing Course Syllabus

This mobile phone repair course covers:

- Theory
- Practical
- Additional Practice

The syllabus for mobile phone repair course is divided into 5 modules. The program covers all the topics that are necessary to learn for repairing and servicing mobile phones.

Module 1 (Basics and Basic Electronics)

The first module will act as a bridging course for those students who do not have any prior knowledge about the field. For others, who already have prior knowledge about electrical and electronic engineering, this module will help them revise these concepts.

- Basics of mobile communication.
- Study of Digital Electronics.

- Assembling and disassembling of various models of mobile phones.
- Study of various tools and equipment used in mobile phone repairs.
- Study of parts inside a mobile phone.
- Using a multimeter.
- Use of DC Power Supply (Jataka machine).

Module 2 (Hardware Repair)

The second module will focus on hardware and teach the students how to handle and replace various electronic parts. It will help them to learn all the hardware repair procedures in a more comprehensive manner.

- Introduction and study of Printed Circuit Board (Motherboard).
- Details of various components on the PCB.
- Testing of various parts and components.
- Study of different ICs (chips) used on the motherboard.
- How to recognize various ICs.
- Soldering & de soldering of components by using a soldering iron.
- Soldering & de soldering of components by using a rework station.
- Reheating and mounting of various BGA and SMD chips.
- Ultrasonic cleaning procedure.

Module 3 (Software Repair)

Software problems are some of the most common ones faced by smartphone users. Sometimes, a software problem can lead to hardware abnormalities as well. This module will teach you how to perform various software repairing techniques.

- Detailed study of various faults arising due to corrupt software.
- Introduction of various flasher boxes and software.
- Flashing of various brands of handsets.
- Removing virus from infected phones.
- Unlocking of handsets through codes and/or software.
- Use of various secret codes.

Module 4 (Basic and Advanced Troubleshooting)

After receiving a customer's complaint, it is important to understand where the problem of the phone lies - hardware or software; and then repair it accordingly. This is where the troubleshooting module will come in handy. This module will teach you how to troubleshoot the problems in a mobile phone almost like an experienced mobile phone repair technician.

- Fault finding, troubleshooting, and repairing of various faults.
- Common repair procedure for hardware related faults.
- Common repair procedure for software related faults.
- Water damaged repair techniques.
- Circuit tracing, jumper techniques and solutions.
- Troubleshooting through schematic diagrams.
- Use of internet for troubleshooting faults.
- Advanced troubleshooting techniques.

Module 5 (Additional Learning)

To be a successful mobile phone repair technician, one needs to know more than just the technical aspects of fixing a phone. This module aims to teach some additional topics to help you become a better mobile phone repair engineer.

- Clearing of all previous doubts
- Guidance to start and manage your own mobile repair center.
- Guidance to successfully work as a technician.
- Procuring tools, spare parts, and accessories.
- Dealing with customers and distributors.
- Marketing your mobile phone repair business

We also teach our students various tips, tricks and trade secrets which are unknown to many technicians. This will help you in your all-round development and make you a professional mobile phone repair technician

- **Assessment and Examinations**:

Assessment will be done as per university/department policy.

Sr. No.	Elements	Weightage	Details
10.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
11.	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
12.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Textbook:

1. Brown, B., & Chalmers, M. (2003). Tourism and mobile technology. In *ECSCW 2003* (pp. 335-354). Springer, Dordrecht.

Reference Books:

1. Wilken, R., & Goggin, G. (Eds.). (2013). *Mobile technology and place*. Routledge.d.

2. Brown, B. (2002). Studying the use of mobile technology. In *Wireless world* (pp. 3-15). Springer, London.

Course Name: TELECOMMUNICATION SERVICES AND TERMINAL EQUIPMENT
Course Code:458

Course description

At the end of the course, the students will understand the telecommunication systems operations in a broad perspective. In view of international nature of the business the students will be informed about the global standardization and regulatory organizations. An overview will be provided on the historic background and evolutionary trends

- Semester: VII
- Credit Hours: 4
- Pre-requisites course requirements/ skills NA

Course Objective

• understanding basic terms and principles of signal processing in telecommunication transmission,

• describing basic principles of the modern digital telecommunications,

• implementing acquired knowledge in professional specialist courses (theoretical and practical),

• understanding basic operation settings for telecommunication systems and equipment.

Course outcomes

1. explain basic physical and technical principles of modern digital telecommunications,

2. describe basic principles of operation in modern digital telecommunication equipment and systems, 3. demonstrate measurements and experiments in laboratory on actual components, devices, equipment, and systems in telecommunications,

4. describe development and implementation methods of telecommunication systems,

5. examine communication equipment for the technical functionality.

COURSE CONTENTS

1. Understand the role of customer in the telecommunication business.
2. State the rights and the obligation of the telecommunication, customer.
3. Describe the mandatory services to be provided by a telecommunication operator.

4. Define the term user friendliness.
5. State the facilities presently available on the customer telephone instruments and other terminal devices.
6. Differentiate between public and private telecommunication system.
7. List the facilities available at the rural and urban telegraph offices of PTCL
8. Describe the salient operation features of modern tele printer.
9. Describe various types of telematics services.
10. Classify Data Communication services on the bearer networks.
11. Describe the Centrex system working.
12. Define value added services.
13. List the facilities presently available on public telephone service
14. State the Broad band ISDN services.
15. Describe the standards and application of EDI
16. List the facilities and services presently available on Internet
17. Compare the various systems for T.V. distribution process service
18. Understand the process of emerging services.

LIST OF PRACTICALS

1. Visit a PTCL Customer Service Centre or cellular mobile operator office and write a report on the facilities
2. Visit a centralized information (17) service center and write report
3. Visit a complaint center (18) and write a report on the procedure adopted for fault removal.
4. Study the Universal Number System and write report on its applications
5. Study the toll-free number system and write report on its applications.
6. Visit a public telegraph office and write report on its layout and the facilities.
7. Study the facilities available on modern telephone set
8. Study the normal facilities provided by PTCL and cellular mobile operator's telephone users.
9. Study the operation of Card Phone.

Assessment and Examinations

Assessment will be done as per university/department policy.

Sr. No.	Elements	Weightage	Details
	Midterm Assessment	35%	It takes place at the mid-point of the semester.
	Formative Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.

Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

RECOMMENDED BOOKS.

Saadawi, T. N., Ammar, M. H., & El Hakeem, A. (1994). *Fundamentals of telecommunication networks*. Wiley-Interscience. Obaidat, M. S., & Boudriga, N. A. (2010). *Fundamentals of performance evaluation of computer and telecommunication systems*. John Wiley & Sons.
Pal, B. P. (Ed.). (1992). *Fundamentals of fibre optics in telecommunication and sensor systems*. Bohem press.

Course Title: **Technical Project Development**

- **Semester:** VIII
- **Credit hours:** 3 +1

Group of students will work on design project of industrial scope and importance under the supervision of faculty members. The duration of the project will be two semesters (7th and 8th semester). The students will complete the project, development of design of experiments, development of flow sheet, material selection, and cost estimation. The progress will be monitored through interim presentations and reports. Finally, written report will be required, duly approved by the teacher

PRACTICE TEACHING

Course Code: BSTE

By the end of Practice Teaching, Student Teachers will be able to:

a. Select and apply content knowledge in planning, implementing, and evaluating

full lessons at the level of teaching specialization.

b. Use initiative in taking up the varied roles of the teacher in and outside the classroom

c. Apply learning theory and knowledge of business education in designing and leading learner-cent red lessons in the relative content area (s)

d. Effectively use a variety of student-centered teaching approaches with whole-class small-groups.

e. Use student management systems and classroom organizational structures to create a motivating classroom climate.

f. Use own analysis and critical feedback from supervisors to improve the quality of planning, teaching, and assessment.

g. Present a professional persona in person and through the selection of artifacts in their professional portfolio

BSTE students who are going for practice teaching must consider the following guiding principles:

1. Get your lesson planning Book from Chairman office.

2. Plan every session will before time and must possess the same in classroom

3. Write down your lesson objectives specifically in terms of behavioral outcomes (intended learning outcomes using appropriate active verbs e.g., define, identify, differentiate, solve, analyze etc.

4. Discuss your lesson plan with your cooperating teacher at least one day before the delivery of that lesson.

5. Allocate time rationally for each unit of the lesson

6. You would be evaluated in terms of

a. Lesson Planning

b. Content

c. Class participation

d. Confidence

e. Eye Contact

f. Voice

g. Writing on the board

h. A.V. Aids

i. Oral Expression

j. Physical Appearance

k. Gestures and Movements

7. Deliver 50-60 lectures and stay in the institution for teaching for six weeks.
8. Be regular and punctual
9. Behave like regular faculty members
10. Get your timetable from the Institution and submit this timetable along with address & phone number or the Institute to supervisor.
11. Participate in extra-curricular activities of the institution during your stay for teaching practice.

- Daily all students of the class are required to prepare two lesson plans/lectures and upload them to the assignment in google classroom and will be online on google meet form 9am –1pm.

- Any of the students can be called for presentations by the supervisors/teachers during 9am to 1pm.
- Only three leaves can be avail by some students during full PT, but it is required to inform all the five teachers about your leave before 8am.
- One student can be called many times during PT
- Attendance will be according to your presence on meet
- Subjects can be chosen form first year till master level business courses only.

DAILY LESSON PLAN

Student Number ----------Name: ----------Date ----------

Subject: ----------Lesson No----------Grade----------

Topic: ----------

Lesson Objectives

a. General Objectives

b. Specific Outcomes

Content

Teaching Aids

Methodology

Timetable

Assignments

Evaluation procedures

Comments and Suggestions by the Teacher/Supervisor

Signature of supervisor

INTERNSHIP

Course Description

Students must complete an internship in a national or international organization or government agency and have responsibility for assignments. They must take on an assignment to work the technical organization or government agency according to their indicated preferences. Students are encouraged to choose a workplace that matches their interests, or the type of job that could benefit their suture career. The areas of technology education in which students are allowed to have their internship include computer Hardware technology, Information technology, Electrical technology, Production, Glass, Ceramic and Pottery, Designing and experimental crafts, Industrial management, and Engineering drawing. The choice of workplace is subject to and final approval by the Course Instructor.

Objective of the Course

This course intends to

a. Allow students to allow students to have real experiences in the working environment

b. Apply their theoretical knowledge in practical situations at the workplace.

c. Encourages students to explore their own strengths and weaknesses regarding their knowledge and working abilities.

d. Create awareness of the responsibilities at work and the difference between a student 'lifestyle and the working lifestyle.

e. Improve their interpersonal relationship skills and have clearer vision of the working environment.

f. Gain knowledge and experience for applying in future careers.

Grading Criteria

Students will be strictly evaluated based on the work attendance and four major takes as shown below:

1. Internship Report
2. Internship viva
3. Employer's Evaluation

Major Tasks

1.Students must write the weekly report based on the following issues:

1.1 What kind of job did you do this week?

1.2 What knowledge do you think you have gained this week?

1.3 Did you meet any new people at the workplace this week? Who were they? In what circumstances did you meet them?

1.4 Did you have any problem at the workplace this week? If so, what were they and what were the methods of problem solving?

NOTE: - Papers that are not typed will not be accepted.

2. Students' details: Overview of the company

2.1 Company details: Overview of the company

2.2 Work responsibilities and assignments

2.3 Problems you have encountered in your assigned tasks

2.4 Knowledge gained from the work experience

2.5 Contribution of the project to the company

2.6 How has the internship expanded/broadened your business knowledge?

2.7 General comments and suggestions for the company

2.8 Illustration & Annexure (All additional reports, charts, pictures diagrams)

3. Students have to prepare a Power point presentation, highlighting the issues in the “Major Tasks” section. The timing of the presentation will be about 30 minutes, to be followed by a question-and-answer session.

4. After the internship period is complected, please ask the person who had supervised you at your internship company to complete the Evaluation Form included in the Internship package.

Course rules and regulations

1.Students must attend the workplaces on the time every day and follow the working hours of the organization strictly. In case of the illness or emergency, students must ask for the permission to be absent from the supervisor at the workplace and inform the course instructor.

2.Students must wear the professional dress to the workplace.

3. Students must be on their best behavior at the workplace.

4. Students must be punctual in every aspect at the workplace (e.g., returning from Lunch, complete the assigned task).

5. Students must complete the weekly report.

6. Students must hand in the final report and the evaluation form to the course instructor by the date of announcement.

DEPARTMENT OF TECHNOLOGY EDUCATION
INSTITUTE OF EDUCATION AND RESEARCH
UNIVERSITY OF THE PUNJAB

EVALUATION SHEET FOR PRACTICE TEACHING

Name of Student Teacher: ----------Students #: ----------

Institution: ----------

Name of Evaluator: ----------

Total Score: ---------- /225 % age: ----------

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1. Teacher Personality

S #	Aspects	Best					Poor
1	Dressing	5	4	3	2	1	0
2	Shoes	5	4	3	2	1	0
3	General impression	5	4	3	2	1	0
	Sub total						
	Total				**/15**		

2. Classroom Management

S #	Aspects	Best					Poor
1	Sitting arrangement in line with the content	5	4	3	2	1	0
2	Structural facilitation for enhancing learning	5	4	3	2	1	0
3	Class control	5	4	3	2	1	0
4	Time management	5	4	3	2	1	0

		Sub total						
		Total				**/20**		

3. Lesson plan

S #	Aspects		Best					Poor
1	General objective(s)		5	4	3	2	1	0
2	Specific objectives		5	4	3	2	1	0
3	Content description		5	4	3	2	1	0
4	Methodology in line with the content		5	4	3	2	1	0
5	Time allocation		5	4	3	2	1	0
6	Home assignment (s) line with the content		5	4	3	2	1	0
7	Evaluation questions		5	4	3	2	1	0
		Sub total	5	4	3	2	1	0
		Total				**/35**		

4. Content

S #	Aspects		Best					Poor
1	Conceptual clarity		5	4	3	2	1	0
2	Conceptual depth		5	4	3	2	1	0
3	Examples effectiveness		5	4	3	2	1	0
4	Effectiveness of answers to students' questions		5	4	3	2	1	0
		Sub total						
		Total				**/20**		

5. Audio visual aids

S #	Aspects		Best					Poor
1	Font size: Multimedia (28)/OHP (18)/Charts (16)/White board__visible to last bench student		5	4	3	2	1	0
2	Text density___as low as possible		5	4	3	2	1	0
3	Visual clarity		5	4	3	2	1	0
4	Writing posture		5	4	3	2	1	0
	Handouts		5	4	3	2	1	0
5	Font size:12		5	4	3	2	1	0
6	Text density as low as possible		5	4	3	2	1	0
7	Visual clarity		5	4	3	2	1	0
		Sub total	5	4	3	2	1	0
		Total			**/35**			

6. Content delivery

S #	Aspects	Best					Poor
1	Body posture	5	4	3	2	1	0
2	Movements	5	4	3	2	1	0
3	Facial expressions	5	4	3	2	1	0
4	Gestures	5	4	3	2	1	0
5	Eye contact	5	4	3	2	1	0
6	Class participation	5	4	3	2	1	0

7	Voice loudness	5	4	3	2	1	0
8	Voice clarity	5	4	3	2	1	0
9	Voice tone	5	4	3	2	1	0
10	Speed	5	4	3	2	1	0
11	Confidence	5	4	3	2	1	0
12	Question(s) handling --encourage students	5	4	3	2	1	0
13	Lesson plan implementation	5	4	3	2	1	0

Sub total

Total /65

7. Lesson plan book

S #	Aspects	Best					Poor
1	Observation lessons….10 at least	5	4	3	2	1	0
2	Completion…. up to date	5	4	3	2	1	0
3	Approval by the cooperating teacher	5	4	3	2	1	0

Sub total

Total /20

8. General (to be filled by the principal/Cooperating teacher)

S #	Aspects	Best					Poor
1	Regularity	5	4	3	2	1	0
2	Administrative support provided by student teacher	5	4	3	2	1	0
3	Relationship with Faculty/Staff	5	4	3	2	1	0

4	Aptitude towards business teaching		5	4	3	2	1	0
		Sub total				/20		
		Total						

9. Consolidation of scores

S #	Categories	Best	Poor
1	Teacher personality		15
2	Classroom management		20
3	Lesson plan		35
4	Content		20
5	Audio visual aids		35
6	Content delivery		65
7	Lesson plan book		15
8	General		20
	Total		225
	Percentage		100

Date of submission to the department _____

Evaluator's signature: _____

Internship Report
Guidelines and Format
2021

Department of Technology Education
Institute of Education and Research
University of the Punjab Lahore

Checklist for a new Academic Program

Parameters	
1.Department Mission and Introduction	✓
2.Program Introduction	✓
3.Program Alignment with University Mission	✓
4.Program Objectives	✓
5.Market Need/ Rationale	✓
6.Admission Eligibility Criteria	✓
7.Duration of the Program	✓
8.Assessment Criteria	✓
9.Courses Categorization as per HEC Recommendation	✓
10.Curriculum Difference	✓
11.Study Scheme / Semester-wise Workload	✓
12.Award of Degree	✓
13.Faculty Strength	✓
14.NOC form Professional Councils (if applicable)	✓

Thank You