

**CURRICULUM**  
**OF**  
**TELECOMMUNICATION ENGINEERING**  
**BE / BSc**  
**ME/ MSc**

**2008**



**HIGHER EDUCATION COMMISSION**  
**ISLAMABAD.**

## **CURRICULUM DIVISION, HEC**

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# PREFACE

Curriculum development is a highly organized and systematic process and involves a number of procedures. Many of these procedures include incorporating the results from international research studies and reforms made in other countries. These studies and reforms are then related to the particular subject and the position in Pakistan so that the proposed curriculum may have its roots in the socio-economics setup in which it is to be introduced. Hence, unlike a machine, it is not possible to accept any curriculum in its entirety. It has to be studied thoroughly and all aspects are to be critically examined before any component is recommended for adoption.

In exercise of the powers conferred by sub-section (1) of section 3 of the Federal Supervision of Curricula Textbooks and Maintenance of Standards of Education Act 1976, the Federal Government vide notification No. D773/76-JEA (cur.), dated December 4<sup>th</sup> 1976, appointed the University Grants Commission as the competent authority to look after the curriculum revision work beyond class XII at the bachelor level and onwards to all degrees, certificates and diplomas awarded by degree colleges, universities and other institutions of higher education.

In pursuance of the above decisions and directives, the Higher Education Commission (HEC) is continually performing curriculum revision in collaboration with universities. According to the decision of the special meeting of Vice-Chancellor's Committee, the curriculum of a subject must be reviewed after every 3 years.

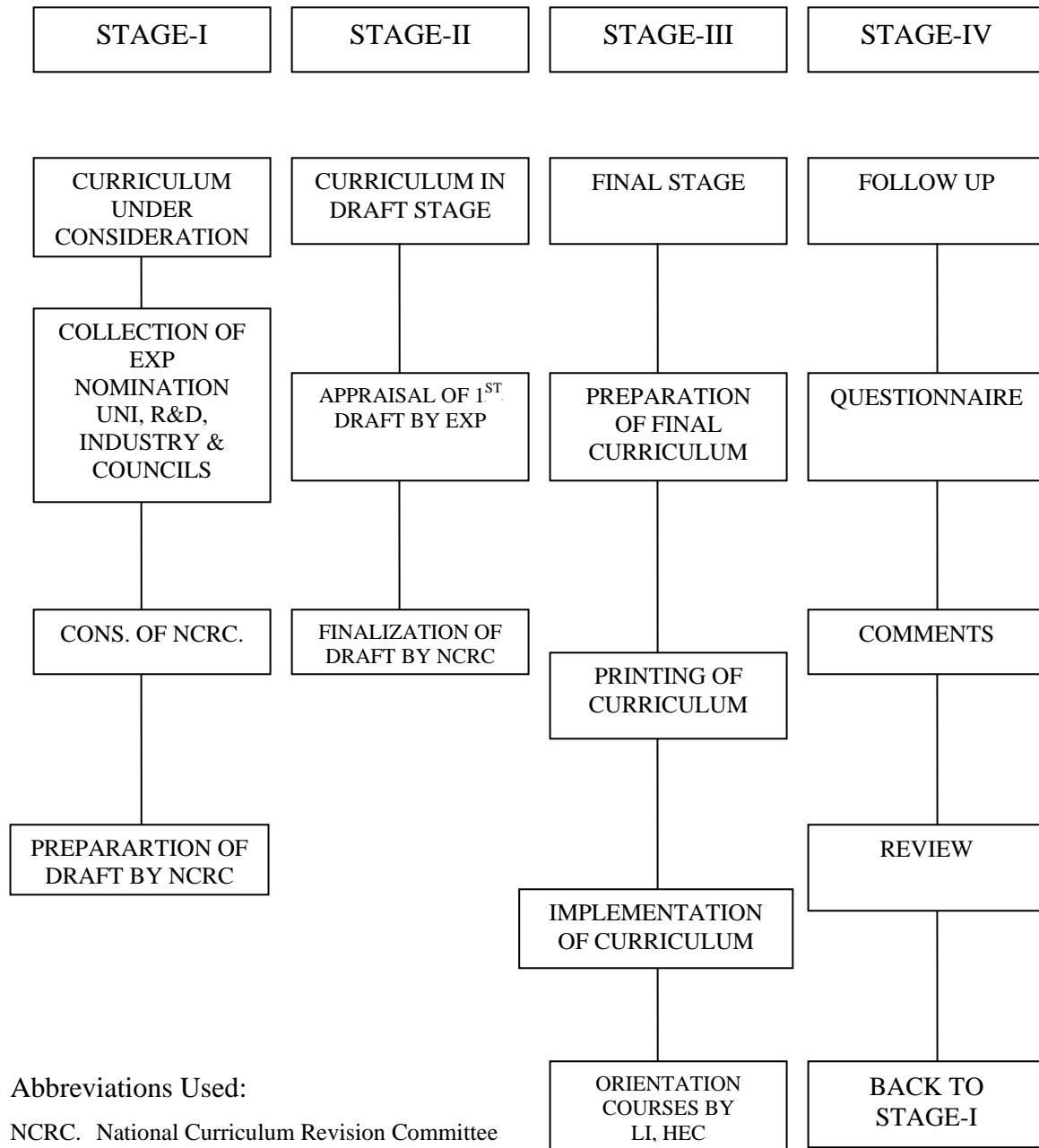
A committee of experts comprising of conveners from the National Curriculum Revision of HEC in Basic, Applied Social Sciences and Engineering disciplines met in April 2007 and developed a unified template to standardize degree programs in the country to bring the national curriculum at par with international standards, and to fulfill the needs of the local industries. It also aimed to give a basic, broad based knowledge to the students to ensure the quality of education. The new BS degree shall be of 4 years duration, and will require the completion of 130-136 credit hours. The engineering degree will devote 65-70% of the curriculum towards engineering courses, and 35--30% to non Engineering courses.

For the purpose of curriculum revision various committees are constituted at the national level, comprising of senior teachers nominated by universities, degree awarding institutions, R&D organizations and respective accreditation councils. The National Curriculum Revision Committee for Telecommunication Engineering in a special meeting held on March 4-6, 2008 at the HEC Regional Centre, Karachi in continuation of its earlier meetings held on August 28-30, 2007 at HEC Regional Center, Karachi revised the curriculum in light of the unified template. The final draft prepared by the National Curriculum Revision Special Committee, duly approved by the competent authority, is being circulated for implementation in the concerned institutions.

**DR. RIAZ-UL-HAQ TARIQ**  
**Member Academics**

**April 2008**

# CURRICULUM DEVELOPMENT



**Abbreviations Used:**

- NCRC. National Curriculum Revision Committee
- VCC. Vice-Chancellor’s Committee
- EXP. Experts
- COL. Colleges
- UNI. Universities
- PREP. Preparation
- REC. Recommendations
- LI Learning Innovation
- R&D Research & Development Organization
- HEC Higher Education Commission

## **INTRODUCTION**

The final meeting of Telecommunication Engineering was held at HEC, Regional Center Karachi from March 4<sup>th</sup> to 6<sup>th</sup> 2008 to finalize the draft curriculum of Telecommunication Engineering at BS/BE and MS/ME levels. The first meeting on drafting the curriculum was held at the Regional Headquarters in Karachi from 28-30 August 2007.

The following attended the meeting in Karachi from the 4<sup>th</sup>-6<sup>th</sup> of March 2008:

1. Dr. Abdul Karim Baloch, Convener  
Professor,  
Department of Electronics & Telecommunication,  
Mehran University of Engineering & Technology,  
Jamshoro
2. Prof. Engr. Hyder Ali Khan, Member  
Department of Electronic & Telecom Engineering,  
International Islamic University, H-10,  
Islamabad
3. Prof. Dr. Abdul Qadir, Member  
Professor  
NED University of Engg. & Technology,  
Karachi
4. Prof. Dr. Bilal A. Alvi, Member  
Chairman,  
Department of Electronic Engineering,  
Sir Syed University of Engg. & Technology,  
Karachi
5. Dr. Najeeb Siddiqui, Member  
Professor,  
Department of Applied Physics,  
University of Karachi, Karachi
6. Dr. Kamal Athar Member  
Chairman,  
Department of Electrical Engineering,  
Air University, E-9, Islamabad
7. Dr. Pervez Akhtar, Member  
Associate Professor/Head,  
Department of Electronic Engineering, PNEC PNS Jauhar  
National University of Science & Technology,  
Karachi

8. Dr. Jameel Ahmed,  
Associate Professor,  
Department of Electronic & Computer Engineering,  
NFC Institute of Engineering & Technology,  
Multan Member
9. Mr. Muhammad Ahmad Kamal,  
Director Industry Development,  
Pakistan Telecommunication Authority,  
PTA Headquarters Building,  
Islamabad Member
10. Dr. Amir Hassan Pathan,  
Senior Joint Director,  
Information Systems & Tech. Department,  
State Bank of Pakistan, Karachi Member
11. Mr. Akbar Rahmatullah,  
Senior Member, Institution of Engineers (Australia)  
Consultant (Quality Assurance),  
Government College University, Lahore Member
12. Engr. Muhammad Aamir,  
Assistant Professor,  
Department of Electronic Engineering,  
Sir Syed University of Engg. & Technology,  
Karachi Member
13. Ms Samreen Amir  
Assistant Professor,  
National University of Computer & Emerging Sciences  
FAST Karachi Member
14. Engr. Sharjeel Farooqui,  
Assistant Professor,  
Department of Telecommunication,  
Foundation University, Islamabad Member
15. Dr. Amir Hasan Pathan,  
Senior Joint Director,  
Information System & Technology Department,  
State Bank of Pakistan, Karachi Member
16. Engr. Yousuf Irfan Zia  
Assistant Professor,  
National University of Computer & Emerging Sciences  
FAST Karachi Member

- |     |  |                  |
|-----|--|------------------|
| 17. | Engr. Waqar Ahmad Rizvi,<br>Senior Technical Manager,<br>CTTC (Pvt) Ltd,<br>Mohammad Ali Jinnah University,<br>Karachi                                 | Member           |
| 18. | Engr. Salman Saad Khan,<br>Pakistan Telecommunicationj Co. Ltd,<br>B-120 Block 18, Gulshan-e-Iqbal,<br>Karachi   | Member           |
| 19. | Dr. Abdul Waheed Umrani,<br>Department of Electronics & Telecommunication,<br>Mehran University of Engineering & Technology,<br>Jamshoro               | Member           |
| 20. | Dr. Muhammad Iqbal Khan,<br>Director,<br>PAF Karachi Institute of Economics & Technology<br>Korangi Creek,<br>Karachi.                                 | Member           |
| 21. | Dr. Syed Afaq Hussain,<br>Professor/Consultant<br>Department of Electronic & Telecommunication Engg.<br>International Islamic University,<br>Islamabad | Member/Secretary |

The meeting started with the recitation of the Holy Quran.

Mr. Tahir Ali Shah, Assistant Director (Curriculum), HEC, briefed the participants and introduced the Director HEC, Regional Centre, Karachi and also formally welcomed the members of the National Curriculum Revision Committee (NCRC), Telecommunication Engineering Discipline. He also requested the members to decide if they wish to continue with the previous Convener and Secretary of the committee or if they wished to appoint new members. To this the house unanimously agreed on the following:

- (a) Convener to be as before, Prof Dr Abdul Kareem Balouch
- (b) Secretary to the committee to be Prof Dr Syed Afaq Hussain

Mr. Tahir Ali Shah Shah distributed the agenda, and stated the importance of the final meeting. He also stressed on the semester credit hour requirements for the various knowledge areas in the discipline and requested the house to restrict the credit hours of the program prescribed in generic framework for Engineering disciplines. The Secretary, Prof Dr Afaq then commenced the proceedings on the scope of the exercise to be under taken in view of the



engineering curriculum requirements and the Pakistan Engineering Council (PEC) and reinstated the requirements outlined by Mr Tahir Ali Shah for implementation.

At this stage, Mr Akbar Rahmatullah brief the committee on the Quality Assurance aspects relating to curriculum design and development. In this regard, Mr Akbar Rahmatullah explained and presented some relevant quality assurance attributes to the committee members as below

- (a) The Higher Education Commission has now set up Quality Enhancement Cells at various Public sector Universities, which were charged with the responsibility of ensuring that Quality Criteria as stipulated by the HEC are being met by the various academic departments within the Public sector Universities.
- (b) The main program segments of Transmission, switching, signaling and Support mathematics module pertaining to Telecommunications should be ensured in both BE and ME programs in telecommunications.
- (c) The curriculum design review process requires two loops – One to review the technical topical outlines, both for syntax and symantics and the other loop to ensure Quality Assurance Aspects.
- (d) The Program mission statement must be formulated carefully and should feed into the Departmental mission statement. Within the Curriculum differentiation should be made between Topical outlines, course outlines and course delivery sequence.
- (e) A program skills matrix pertaining to telecommunications needs to be developed by each of the Universities offering the program in telecommunications to ensure if the stated objectives are being met. A List of telecommunications skills was also presented which included:
  - Analytical computations and mathematical modeling
  - Interpretation of data sheets on Telecommunications
  - Use of measurement instruments
  - Lifelong learning and Research skills
  - Written and Oral Communication skills
  - Global awareness
  - Teamwork and Leadership skills
- (f) With regard to the non-engineering BS Telecom programs, the issue of regulation and accreditation of these programs were also raised by Mr. Akbar Rahmatullah and debated by the committee, through the secretary and convener of the NCRC. It was decided that that the committee would recommend that HEC should look into the

accreditation of non-engineering programs, and that this matter be taken up by the Quality Assurance Agency (QAA) of the Higher Education Commission..

On first day of the meeting, a brain storming session on the review of eight semester courses was made with high degree of deliberation and exchange of different views and suggestions to finalize the BE Curriculum. The house also worked extensively in reducing the semester credit hour loading per semester (and hence for the entire course). The day concluded by sub committees looking into finalizing topical outlines. The following two sub-committees were made in order to review and revise the syllabus of the curriculum in the light of Telecommunication and Electrical/Electronic streams.

**Subcommittee-I (Telecommunication Engineering Courses)**

1. Dr. Jameel Ahmed
2. Mr. Muhammad Ahmed Kamal
3. Mr. Akbar Rahmatullah
4. Prof Dr Abdul Qadir

**Sub-Committee-II (Electronic & Electrical Engineering Courses)**

1. Dr. S. Afaq Hussain
2. Ms Samrina Amir
3. Engr Sherjeel Farooqi

Mr. Muhammad Ahmed Kamal representing Pakistan Telecommunication Authority (PTA) briefed the house on the rationale of the programme in accordance with changing environment in telecom industry so that we could remain updated on modern technologies systems.

On third day of the meeting, a curriculum comprising on eight semesters was finalized with consensus and syllabus was also presented by two sub committees. Further, course coding was also reviewed and revised for all given subjects.

Mr Akbar Rahmatullah presented before the committee the case of Beaconhouse National University, from whom an email was received with regards to their BS in Telecommunication systems. This was discussed before the house and it was recommended by the Convener, that a separate meeting should be organized to address the issue of BS Telecommunications issue as this was being offered in Pakistan by a number of Universities.

In addition, the Master program for Telecommunication Engineering was also reviewed and revised. In this connection three main streams for

specialization were adopted and their related courses were placed accordingly.

The meeting ended with a vote of thanks to Convener, the committee members and special thanks to Mr. Tahir Ali Shah for his contribution in the coordination of the meeting. The house also greatly acknowledged HEC Regional Centre Karachi for hospitality support.

## **Rational**

Engineering and Applied Sciences play an important role in the overall development of a nation. It reflects the sense of national development and could be considered as a pride. A nation with an advanced engineering programme and facilities forms the backbone of industrial revolution and is essential in developing economies. Strength in engineering areas provides special leverage and is also reflected in the political and foreign policies of the country as well. In order to meet the demands of the 21<sup>st</sup> century, Pakistan needs to strengthen its Technological base, especially in the areas of Telecommunications and Information technologies. However, to fully benefit from the generous policies in this matter from the government of Pakistan, a long-term and far-reaching policy needs to be developed in the design of curriculum on telecommunications. This requires a vision; a vision which is not only sufficient for today but is also valid for the next decade as well. It is imperative that such a vision is just not only based on tall claims but have adequate tangible figures that can form the basis of evaluation, and subsequent up-gradation. For the telecommunications industry, this document is a step forward in this direction.

Another vital aspect in such an exercise lies with the quality of the graduates being produced by the Universities and Higher Education Institutes in Pakistan. The proliferation of colleges offering Bachelor and Master degree programmes (related to different disciplines) has resulted in large variations in curricula, the critical shortage of qualified faculty and quality universities, the high cost of education, hindering growth and expansion of current universities and poor monitoring and accreditation mechanisms are the key reasons for the poor quality of manpower being produced.

## **Goal:**

To produce Quality Telecommunication graduates of intellectual standard and calibre designed to meet the current and future needs in the field of telecommunications, both in Pakistan and Internationally, by contribution in theoretical foundations and critical analysis of application areas within the Telecommunications industry

## Objectives

The Telecommunication Engineering curriculum has been developed with the following objectives in mind:

1. Equip the students with fundamental and advanced concepts of Electronic and Telecommunications Engineering with particular emphasis on the application of these concepts to further advance the state of technology and to meet the needs of the Telecommunications industry.
2. To Equip the students with hands-on experience on key telecommunications Test and measurement equipment, where possible.
3. To Impart effective leadership and decision-making skills.
4. To train students in effective verbal and written communication skills.
5. To impart key principles and skills to enable the students to practice as good and responsible Telecommunication engineers, through courses in professional ethics, engineering management, engineering economics, and entrepreneurship.
6. To equip the students with life long learning and research skills
7. To equip students undertaking Telecommunications engineering to develop appropriate analytical models based on given specifications.

## **Curriculum Review Basis – Undergraduate Degrees**

The curriculum for the undergraduate engineering degree program is based on the following considerations:

### Duration

Total duration: Four (4) calendar years  
Total number of semesters: Eight (8)  
Duration of a semester: > Sixteen (16) weeks of instruction  
> One (1) to two (2) weeks for examinations

### Credit Hours

Total number of credit hours: 130-134  
Contact hours: > One (1) contact hour per week for each credit hour of instruction  
> Three (3) contact hours per week for each credit hour of laboratory work

Total number of contact hours: At least 3,200 hours

### Course Division

Ratio of Engineering to Non-Engineering courses: 70:30

## **Curriculum Review Basis – Graduate Degrees**

The curriculum for the graduate engineering degree program is based on the following considerations:

### Duration

Total duration: Two (2) calendar years  
Total number of semesters: Four (4)  
Duration of a semester: > Sixteen (16) weeks of instruction  
> One (1) to two (2) weeks for examinations

### Credit Hours

Total number of credit hours: > 30 (24 Credit hours of coursework and 6 credit hours of thesis)  
Contact hours: > One (1) contact hour per week for each credit hour of instruction  
> Three (3) contact hours per week for each credit hour of laboratory work

# Framework for BE/BS in Telecommunication Engineering

Duration: 4 years  
 Semesters: 8  
 Number of weeks per semester: 16-18 (16 for teaching and 2 for examination)  
 Total number of Credit Hours (CH): 130 – 136  
 Number of Credit Hour (CH) per semester: 15 – 18  
 Engineering Domain Courses: 70%  
 Non-engineering Domain Course: 30%

Knowledge Area	Sub Area	Name of course	Lec. CH	Lab. CH	Credit Hours (CH)	Total courses	Total Credits
Humanities	English	Eng-I Functional English	3	0	3	3	9
		Eng-II Communication Skills	3	0	3		
		Eng-III Technical Report Writing & Presentation	3	0	3		
	Culture	Islamic Studies	2	0	2	2	4
		Pakistan studies	2	0	2		
	Social Sciences	Professional Practices Social Sciences-Elective	3	0	3	2	6
3			0	3			
Management Sciences	--	Engineering Economics	3	0	3	2	6
		Engineering Management	3	0	3		
Natural Science	Math	Calculus & Analytical Geometry	3	0	3	4	12
		Multivariable Calculus	3	0	3		
		Linear Algebra	3	0	3		
		Differential Equations	3	0	3		
	Physics	Applied Physics	3	1	4	1	4
Total						14	41

Knowledge Area	Sub Area	Name of course	Lec CH	Lab CH	Credit Hours	Cour ses	Total Credits
Computing	Fundamentals	Introduction to computing	2	1	3	3	7
	Programming	Object Oriented Programming	2	1	3		
	Application	Computer Aided Engineering Design	0	1	1		
Engineering Foundation	--	Basic Electronics	3	1	4	8	28
		Introduction to Telecommunications	3	0	3		
		Digital Logic Design	3	1	4		
		Electromagnetic Theory	3	0	3		
		Circuit Analysis	3	1	4		
		Communication Systems	3	1	4		
		Signals & Systems	3	0	3		
		Probability Methods in Engineering	3	0	3		
Major Based Core (Breadth)	--	Digital Communications	3	1	4	6	24
		Microprocessor & Interfacing Techniques	3	1	4		
		Digital Signal Processing	3	1	4		
		Amplifiers & Oscillators	3	1	4		
		Control Systems	3	1	4		
		Wave propagation and Antennas	3	1	4		
Major Based core (Depth)	--	Computer Communication & Networks	3	1	4	6	19-24
		Transmission & Switching Systems	3	0/1	3/4		
		Wireless & Mobile Communications	3	0/1	3/4		
		RF & Microwave Engineering	3	0/1	3/4		
		MBC Depth Elective I	3	0/1	3/4		
		MBC Depth Elective II	3	0/1	3/4		
Inter-disciplinary Eng. (Elective)	--	ID Electives I	2	1	3	2	6
		ID Electives II	2	1	3		
Project (Final)						1	6
Industrial Training ( Summer )			0	0	0	0	0
Total			-	-	-	26	90-95
Grand Total						40	131-135

## SCHEME OF STUDIES FOR BE/BSc IN TELECOMMUNICATION ENGINEERING

<b>Semester 1</b>					
<b>S. #</b>	<b>Code</b>	<b>Course Title</b>	<b>Lec Hours</b>	<b>Lab Hours</b>	<b>Credit Hours</b>
1	HU101	Eng-I Functional English	3	0	3
2	CS105	Introduction to Computing	2	1	3
3	MA101	Calculus & Analytical Geometry	3	0	3
4	PH103	Applied Physics	3	1	4
5	MA111	Linear Algebra	3	0	3
		<b>Total</b>	<b>14</b>	<b>2</b>	<b>16</b>
<b>Semester 2</b>					
1	HU112	Eng-1I Communication Skills	3	0	3
2	CS106	Object Oriented Programming	2	1	3
3	HU121	Islamic Studies	2	0	2
4	TE112	Introduction to Telecommunications	3	0	3
5	MA102	Multivariable Calculus	3	0	3
6	HU132	Pakistan Studies	2	0	2
		<b>Total</b>	<b>15</b>	<b>1</b>	<b>16</b>
<b>Semester 3</b>					
1	HU213	Eng-III Technical Report Writing & Presentation	3	0	3
2		ID Elective I	2	1	3
3	MA201	Differential Equations	3	0	3
4	EE213	Circuit Analysis	3	1	4
5	EE241	Computer Aided Engineering Drawing	0	1	1
6	EE215	Basic Electronics	3	1	4
		<b>Total</b>	<b>14</b>	<b>4</b>	<b>18</b>
<b>Semester 4</b>					
1	TE337	Computer Communication & Networks	3	1	4
2	EE216	Amplifiers & Oscillators	3	1	4
3	EE224	Signals & Systems	3	0	3
4	EE232	Digital Logic Design	3	1	4
5	TE313	Probability Methods in Engineering	3	0	3
		<b>Total</b>	<b>15</b>	<b>3</b>	<b>18</b>



<b>Semester 5</b>					
1	TE222	Electromagnetic Theory	3	0	3
2	EE323	Control System	3	1	4
3	TE335	Communication Systems	3	1	4
4	EE325	Digital Signal Processing	3	1	4
5	MG324	Engineering Economics	3	0	3
		<b>Total</b>	<b>15</b>	<b>3</b>	<b>18</b>
<b>Semester 6</b>					
1	TE336	Digital Communication	3	1	4
2	TE324	Wave Propagation & Antennas	3	1	4
3		Wireless & Mobile Communications	3	0	3
4	EE333	Microprocessors & Interfacing Techniques	3	1	4
5	SS211	Professional Practices	3	0	3
		<b>Total</b>	<b>15</b>	<b>3</b>	<b>18</b>
<b>Semester 7</b>					
1	MG425	Engineering Management	3	0	3
2		RF & Microwave Engineering	3	1	4
3		ID Elective I	2	1	3
4		MBC Depth Elective I	3	0/1	3/4
5	TE499	Final Year Design Project-I	0	3	3
		<b>Total</b>	<b>11</b>	<b>5/6</b>	<b>16/17</b>
<b>Semester 8</b>					
1	TE434	Transmission & Switching Systems	3	0/1	3/4
3		MBC Depth Elective I	3	0/1	3/4
4		Social Science Elective-II	3	0	3
5	TE499	Final Year Design Project-II	0	3	3
		<b>Total</b>	<b>9</b>	<b>3/5</b>	<b>12/14</b>
		<b>Grand Total</b>	<b>108</b>	<b>75</b>	<b>132/135</b>

### **Major Based Core (MBC) Depth Electives**

Multimedia Systems  
 Digital Electronics  
 Digital Image Processing  
 Satellite Communication  
 Optical Fibre Communications  
 Telecom Policies and Protocols  
 Telecom Traffic Engineering  
 Spread Spectrum Communications  
 Speech Processing  
 Next Generation Networks

Network Security  
Broadband Communication  
Networks  
Radar System Engineering  
Telecommunication Management  
Networks (TMN)  
Radio and Television Engineering  
Compression Techniques  
Telecommunication Systems

**ID Electives**

Numerical Methods in Engineering  
Operating Systems  
VLSI Systems  
Data Structure and Algorithms  
Database Management Systems  
Embedded Systems  
Artificial Intelligence  
Reliability in Telecommunication  
Systems

**Social Science Electives**

Organizational Behavior  
Psychology  
Public Policy  
Sociology  
Political Science  
Pakistani Culture and Society

**DETAILS OF COURSES**  
**FOR BE/BSc IN TELECOMMUNICATION ENGINEERING**

*HU1xx Functional English* 3 + 0

**Course Outline:** HEC Approved Course (Annex-A)

*HU1xx Communication Skills* 3 + 0

**Course Outline:** HEC Approved Course (Annex-A)

*HU2xx Technical Report Writing & Presentation Skills* 3+ 0

**Course Outline:** HEC Approved Course (Annex-A)

*HU101 Islamic Studies* 2 + 0

**Course Outline:** HEC Approved Course (Annex-B)

*HU1xx Pakistan Studies* 2 + 0

**Course Outline:** HEC Approved Course (Annex-C)

*MA101 Calculus and Analytical Geometry* 3 + 0

**Prerequisite:** None

**Objective:**

Teach the concepts of calculus and analytic geometry and the applications of these concepts to the solution of engineering problems.

**Course Outline:**

Introduction to functions, introduction to limit, derivatives and their applications, integral calculus with applications, vector algebra, vector calculus, introduction to analytical geometry, straight line in R<sup>3</sup>, planes, cylindrical and spherical coordinates, surfaces, cylinders and cones, spheres, spherical trigonometry.

**Recommended Books:**

1. George B. Thomas and Ross L. Finney, "Calculus and Analytic Geometry," Latest Edition, Addison-Wesley, ISBN: 0201531747.
2. George F. Simmons, "Calculus with Analytic Geometry," Latest Edition, McGraw-Hill, ISBN: 0070576424.
3. Gerald B. Folland, "Advanced Calculus," Latest Edition, Prentice Hall,

ISBN: 0130652652.

4. Monty J. Strauss, Gerald L. Bradley and Karl J. Smith, "Calculus", Latest Edition, Prentice Hall, ISBN: 0130918717.

## *MA103 Linear Algebra*

3 + 0

**Prerequisite: None**

### **Objective:**

Introduce the matrix theory and the use of matrices in the solution of engineering problems.

### **Course Outline:**

Introduction to matrices, elementary row operations and vector spaces: Brief introduction to matrices. Symmetric and Hermitian matrices, Introduction to elementary row operations, Echelon form and reduced echelon form. Rank of a matrix. Inverse of a matrix by using elementary row operations. Vector spaces. Vector subspaces. Linear combination, Linear dependence and basis, linear transformation, System of Linear equations: System of non-homogeneous and homogeneous linear equations, Gaussian elimination method, Gauss Jordan method, Consistency criterion for solution of homogeneous and non-homogeneous system of linear equations. Applications of system of linear equations, Determinants: Introduction to determinants, Properties of determinants of order  $n$ , Axiomatic definition of a determinant. Applications of determinants (Cramer's Rule).

### **Recommended Books:**

1. Bernard Kolman and David Hill, "Elementary Linear Algebra," Latest Edition Prentice Hall, ISBN: 0130457876.
2. Kenneth Hardy, "Linear Algebra for Engineers and Scientists Using Matlab," Latest Edition, Prentice Hall, ISBN: 0139067280.
3. Stephen Goode, "Differential Equations and Linear Algebra," Latest Edition, Prentice Hall, ISBN: 013263757X.

## *MA201 Differential Equations*

3 + 0

**Prerequisite: Calculus & Analytic Geometry**

### **Objective:**

Introduce differential equations and teach methods to solve First and Second Order homogeneous differential equations

### **Course Outline:**

Differential equations of first order: Differential equations and their classification, formation of differential equations, solution of differential equations, initial and boundary conditions, Methods of solution of differential equation of first order and first-degree: Separable equations,

homogeneous equations, equations reducible to homogeneous, exact differential equations, integrating factor, linear equations, Bernoulli equations, orthogonal trajectories in Cartesian and polar coordinates, applications of first order differential equations. Non linear first order differential equations.

Non linear first order differential equations: Equations solvable for  $p$ , for  $y$  and for  $x$ , Clairauts equations.

Higher Order Linear Differential Equations: Homogeneous linear equations of order  $n$  with constant coefficients, auxiliary/ characteristics equations. Solution of higher order differential equation according to the roots of auxiliary equation. (Real and distinct, Real and repeated, and Complex). Non-homogeneous linear equations. Working rules for finding particular integral. Cauchy Euler equation.

### **Recommended Books:**

1. Erwin Kreyszig, "Advanced Engineering Mathematics," Latest Edition,
2. International Edition, John Wiley & Sons, ISBN: 0471728977.
3. John Polking, Al Boggess, and David Arnold "Differential Equations," Latest Edition, Prentice Hall, ISBN: 0131437380.
4. Stephen Goode, "Differential Equations and Linear Algebra," Latest Edition, Prentice Hall, ISBN: 013263757X.

**Prerequisites: None**

### **Course Objective:**

To introduce the students to basic concepts of Electrical Engineering.

### **Course Outline:**

Wave Motion, Mathematical Concepts of Simple and Damped Harmonic Motion, Analytical Treatments of Superposition of Waves, Concepts and Applications of Diffraction and Polarization of Light and Sound Waves, Thermo dynamical Concepts and Basics of Electrodynamics, Electric Charge, Coulomb's Law, Electric Field and Intensity, Electric Potential, Capacitors and Charge Storage Concepts, Magnetism, Magnetic Fields, Faraday's and Lenz's Laws, Ampere's Law and its Applications, Eddy Currents, Inductance, Induced Current and Their Applications (Transformers, Generators Etc.), AC Signals (Average and RMS Values), Electric and Magnetic Circuits, Electric Current, Resistance, Ohm's Law, Simple Resistive Circuits (Series and Parallel), Kirchoff Laws, Network Theorems (DC Analysis), RC and RL Circuits, Linear Coefficient of Expansion of Metals, Specific Heat and Temperature of a Hot Body.

**Lab Outline:**

Series and Parallel combination of resistance, Inductance, capacitance, Kirchoff Laws, Network Theorems, The Heating Effects of an Electric Current, Electromagnetic Induction, Reflection and Refraction of Light. Diffraction, total internal deflection.

**Recommended Books:**

1. University Physics by Freedman and Young (Latest Edition),
2. College Physics by Resnick, Halliday and Krane (Latest Edition)

**MT101 *Engineering Economics*****3 + 0****Prerequisite: None****Objective:**

Introduce the concepts of economics that engineers need to know to carry out Engineering tasks and projects.

**Course Outline:**

Basic concepts, Engineering economy defined, Measures of financial effectiveness, Monetary values. Consumer and producer goods, Measures of economic worth, Price, Supply, Demand Relationship, Present economy, selection among materials, Techniques, designs, etc. A basic investment philosophy, Alternatives having identical lives. Alternatives having different lives, Important cost concepts, Cost-benefit analysis feasibility studies, value analysis in designing and purchasing., Mathematical statement of linear programming problems, Graphic solution, simplex procedure, Duality problem., Types of Depreciation economic life, profit and interest, Returns to capital, Discrete and continuous compounding, Discounting sinking fund problems, Capital Financing and Budgeting: Types of ownership, Types of stock, Partnership and joint stock companies, Banking and Specialized Credit Institution, Factors of production, Laws of Returns, Break-even charts and relationships, Labour problems, labour organizations prevention and settlement of disputes..

**Recommended Books:**

1. Engineering Economy, Latest Edition, Leland T. Blank and Anthony J. Tarquin, McGraw Hill, ISBN: 0073205346

**MT402 *Engineering Management*****3 + 0****Prerequisite: None****Objective:**

Teach the principles of management including the management of human resources as well as Engineering projects.

## **Course Outline:**

Introduction to Principles of Management and Organizational Behaviour as They Apply To the Engineering Profession. Special Emphasis on Project Management, Team Building, Quality Leadership, and the Marketing of Technology. Group Exercises, standard methodologies for managing projects, project life cycle, design implementation interface, estimating, contractual risk allocation, scheduling: PBS and WBS, integration of scope, time, resource and cost dimensions of a project; evaluation of labor, material, equipment, and subcontract resources; scheduling techniques such as CPM/PERT and GERT, critical chain, solving real-world project schedules, cost budgeting, cost baseline, cash flow analysis, earned value analysis, cost control, proposal presentation, application of software for project management. Case Studies.

## **Recommended Books:**

1. Avraham Shtub, Jonathan F. Bard and Shlomo Globerson, "Project Management: Processes, Methodologies, and Economics" Second Edition, 2005, Prentice Hall, ISBN: 0130413313.

*MT402 Professional Practices*

3 + 0

**Prerequisite: None**

## **Objective:**

To introduce the "human element" in the profession of telecommunication Engineering.

## **Course Outline:**

This course introduces contemporary and controversial ethical issues facing the professional community. Topics include moral reasoning, moral dilemmas, law and morality, equity, justice and fairness, ethical standards, and moral development. Upon completion, students should be able to demonstrate an understanding of their moral responsibilities and obligations as members of the workforce and society.

## **Recommended Books:**

1. C. Ferrell, John Fraedrich and Linda Ferrell, "Business Ethics: Ethical Decision Making and Cases," Latest Edition, Houghton Mifflin Company, ISBN: 0618395733.
2. Mike W. Martin and Roland Schinzinger, "Ethics in Engineering," Latest Edition, McGraw-Hill, ISBN: 0072831154.

<i>Social Science Elective</i>	3 + 0
<i>Annex-D</i>	
Organizational Behavior	
Psychology	
Public Policy	
Sociology	
Political Science	
Pakistani Culture and Society	



# Engineering Domain

TE112 *Introduction to Telecommunications*

3 + 0

**Prerequisite:** None

## **Objective:**

To introduce the basic concepts and nomenclature specific to Telecommunications.

## **Course Outline:**

The structure of modern integrated Telecommunication systems and Networks, Structure of PSTN, PLMN and basic Telecommunications nomenclature, Electromagnetic spectrum, Classification of frequencies into bands for various applications including HF, VHF and UHF communications, Radio, Television, Satellite, Radar, GSM, CDMA, Avionics ( ILS, HF comm., VOR, NDB etc), frequency and wavelength, intermodulation frequencies, linear and non linear mixing of signals, absolute and relative dB levels, ionospheric communications, Amplifiers, Oscillators and Filters, AM and FM modulation (time and frequency domain), wave propagation and tropospheric scatter, Telecommunications front end analysis, superhetrodyning, choice of Intermediate frequencies, ganging and tracking, tracking error, Image frequency rejection, spectrum analyzer and the superhetrodyne receiver, single and double conversion superhetrodyne.

ISO, OSI seven layer model, purpose and function of each layer, HDLC protocol, Case study on the Narrowband ISDN Basic rate access protocol, covering the ISDN Overview, standards, physical Layer, data Link Layer and Network Layer aspects, protocol analysis based on ITU-T Q.921/Q.931 procedures.

## **Recommended Books :**

1. Miller "Communication systems"
2. William Stallings, "ISDN and Broadband ISDN with ATM and Frame relay" (Latest Edition),

**Prerequisite:** None

**Objective:**

To introduce the computer components and programming principle

**Course Outline:**

History, classification, basic components, CPU, memory, peripheral devices, storage media and devices, physical and logical storage, data organization, file storage, programs and software, system software, application software, operating systems, programming languages, compilation and interpretation, problem specification, algorithms, flow chart, pseudo code, basic programming techniques, data types and declaration, header file and linkage, variables and constants, arrays, input/output, termination, remark, control structures, branching, conditional structures, repetition and loops, basic library functions

**Lab Outline:**

Basic machines organization including motherboard, memory, I/O cards, Networking devices, Use of flow charts, Introduction to office tools, Introduction to various operating systems, Coding, executing and debugging simple programs, Implementation of simple control structures, Implementation of simple functions, Implementation of different function styles, input/output, loops, conditional Branching, mouse control, graphics.

**Recommended Books:**

1. Brian Williams and Stacey Sawyer, *Using Information Technology, Latest Edition*, McGraw-Hill, ISBN: 0072260718
2. William Stallings, *Computer Organization and Architecture: Designing for Performance, Latest Edition*, Prentice Hall, ISBN: 0131856448, ISBN-13: 9780131856448
3. Robert Lafore *“Thinking in C”* Latest Edition

**Course Outline:**

Procedural versus object oriented programming languages, object oriented design strategy and problem solving, Pointers, File handling, objects and classes, member functions, public and private members, dynamic memory management, constructors and destructors, templates, object encapsulation, derived classes, class hierarchies, inheritance and polymorphism, operator overloading, stream class, practical design through Object Oriented Programming

**Lab Outline:**

Object oriented programming environment, Implementation of object oriented programs: classes, methods, objects, abstract classes and inheritance, overloading and overriding, class aggregation, implementation of polymorphism, use of constructors & destructors, memory management, testing and debugging.

**Recommended Books:**

1. Robert Lafore, Object oriented programming using C++ (Latest Edition)

**Prerequisite:** PH103 Applied Physics

**Objective:**

To provide the foundation of electronic devices & circuits

**Course Outline:**

Introduction to Electronics, Semiconductor Diodes, Forward & Reverse Characteristics of Diode, Special Purpose Diodes, Equivalent Circuit of a Diode, Diode as a Switch, Diode Applications, Half Wave & Full wave rectifiers, Clipper & Clamper circuits, Bipolar Junction Transistor, Transistor Operation, Types of Transistor, Unbiased Transistor, Transistor Biasing Configurations, Common Emitter, Common Base, Common Collector, DC & AC analysis of BJT, Field Effect Transistors, FET Biasing Techniques, Common drain, common source, common gate, fixed Bias and Self Bias Configuration, Voltage Divider Biasing, Universal JFET Bias Curve. DC & AC analysis of FET

**Lab Outline:**

The emphasis is first on understanding the characteristics of basic circuits including resistors, capacitors, diodes, and bipolar and field effect transistors. The students then use this understanding to construct more complex circuits such as rectifier circuits and power supplies.

**Recommended Books:**

1. Robert Boylestad and Louis Nashelsky, *Electronic Devices and Circuit Theory*, Latest Edition, Prentice Hall, ISBN: 0131189050, ISBN-13: 9780131189058
2. *Introductory Electronic Devices and Circuits: Electron Flow Version*, Latest Edition, Robert Paynter, Prentice Hall, ISBN10: 0131716395, ISBN-13: 9780131716391
3. Qurban A. Memon, Irfan A. Halepoto, *A Practical Book on Basic Electronics*, Latest Edition, Naseem Book Depot, ISBN: 969-8680-14-4
4. B.S.Chowdhry and Ahsan Ursani, *The First Practical Book on Electronic Workshop*, Latest Edition, Mehran Infotech Consultants, ISBN: 969-8680-03-9

**Prerequisites:** Applied Physics

**Objective:**

The objective of this course is to build the basics of AC analysis of RLC circuits.

**Course Outline:**

The Sinusoidal Response, Transient & Steady state responses, Complex Forcing Functions. The Phasor, Passive Circuit elements in the Frequency Domain, Series, Parallel, and Delta-to-Star Simplifications, Types of sources (Dependent & Independent) Source Transformations and Network Theorems in Frequency Domain. The Transformer, Ideal Transformer, Instantaneous and Complex Power, Balanced Three-Phase Systems, Poles and Zeros of  $F(s)$ , The Transfer Function, Poles & Zeros, Stability & S-plane, Preliminaries of passive Filters, General Two-Port Networks and Parameters.

**Lab Outline:**

Related concepts should be established through simulation using PSPICE, ICAPS, etc.

**Recommended Book:**

1. *“Engineering Circuit Analysis”, William H. Hayt, Jack Kemmerly, and Steven M. Durbin, Available latest edition.*
2. *“Electric Circuits”, by J.W. Nilsson and Susan A. Riedel, Addison-Wesley Publishing, Available latest edition.*
3. *“Introductory Circuit Analysis”, Robert L. Boylestad, Prentice Hall. Available latest edition.*

**Prerequisite:** None

**Objective:**

Introduce the concepts and tools for the design of digital electronic circuits using sequential and combinatorial logic.

**Course Outline:**

Review of Boolean Algebra, Logic Gates (AND, OR, Not, etc.), Karnaugh Maps, QM Method, Flip Flop, (RS, JK, D, T, Master Slave), Half & Full Adder & Subtractor, Comparator Combinatorial & Sequential Circuits, Encoders, Decoders, Multiplexer, De-multiplexer, Counters, Registers, Memories, PLAs, State Transition Diagram. Programmable Logic Devices (PLDs).

**Lab Outline:**

Basic logic gates; Verilog simulation and hardware implementation of combinational circuits such as MUX/DEMUX, encoder/decoder, arithmetic logic unit (ALU); Verilog simulation and hardware implementation of sequential circuits such as flip-flops, registers, shift registers, counters; implementation of logic circuits using SPLDs; project solving a real-life problem.

**Recommended Books:**

1. M. Morris Mano, *Digital Design & XILINX 6.3 XSE PKG*, First Edition, 2005, Prentice Hall, ISBN10: 0131678485, ISBN: 9780131678484
2. Roger L Tokheim, *Digital Electronics: Principles and Applications*, Student Text with MultiSIM CD-ROM, 6th Edition, 2002, McGraw-Hill, ISBN: 0078309816
3. R.C. Tocci, "Digital Logic Fundamentals".
4. W. Floyd "Digital Fundamental"

**EE333 | Microprocessors & Interfacing Techniques | 3 + 1**

**Prerequisite:** EE232 Digital Logic Design

**Objective:**

The objective of this course is to provide extensive knowledge of microprocessor based systems and interfacing techniques.

**Course Outline:**

Introduction to Microprocessors Based Computer System, Internal Registers of Microprocessor, Memory Addressing, Segment and Offset Addressing, Data Addressing Modes, Program Memory Addressing Modes, Stack Memory Addressing Modes, Instruction Set of Microprocessor, Flow of an Assembly Language, Procedures, Programming Techniques, Hardware Specifications of 8086/8088 Microprocessor, Pin-outs and Pin functions, Clock generator, Bus Interfacing, Latching and Bus Timing. Memory Interfacing and Address Decoding Techniques, Memory mapped and Isolated I/O, Personal computer I/O Map, I/O port Address decoding, Programmable Peripheral Interface, Programmable Interval Timer, Analog to Digital Converter interfacing techniques, Basic Interrupt Processing, Hardware and Software Interrupts, Expanding Interrupt Structure, Programmable Interrupt Controllers, Direct Memory Access operation and Interfacing. Introduction to Microcontrollers.

**Lab Outline:**

Theory related concepts should be implemented using hardware trainers. e.g. BGC, Midas, etc.

**Recommended Books:**

1. The Intel Microprocessors Architecture, Programming and Interfacing by Barry B. Brey

2. Microprocessors and Interfacing: Programming and Hardware by Douglas V. Hall
3. Digital Computer Electronics by Albert P. Malvino / Jerald A. Brown

## EE216 Amplifiers and Oscillators

3 + 1

**Prerequisite:** EE215 Basic Electronics

### **Objective:**

To introduce the student to the basic concepts of electronic amplification & Oscillation as key building blocks in telecommunication system.

### **Course Outline:**

Amplifier Fundamentals, Multistage amplifier with Ac and DC analysis, Differential Amplifier, Op-Amplifier, Classification of amplifiers on the basis of biasing, Class A, B, C, Push pull amplifiers, Classification of Amplifiers on the basis of coupling, RC-coupled amplifier, transformer-coupled amplifier, direct-coupled amplifier, Classification of amplifiers on the basis of frequency, Audio frequency amplifier, radio frequency amplifier, tuned amplifier, Feedback Amplifiers, Effect of feedback on frequency response, Input and output impedance, Amplifier loading, impedance matching, Oscillators, Barkhausen criterion, Tank circuit, Damped and un-damped oscillations, RC type oscillator (Phase shift, Weinbridge) and LC oscillator (Hartley, Colpitt, Armstrong), crystal oscillator, special oscillators (OTA-based, OTI-based oscillators Voltage Controlled Oscillator, Phase Lock Loop, Introduction to Filters

### **Lab Outline:**

Transistor Curve Tracer, Introduction to PSPICE and AC Voltage Dividers, Characterization and Design of Emitter and Source Followers, Characterization and Design of an AC Variable-Gain Amplifier, Design of Test Circuits for BJT's and FET's and Design of FET Ring Oscillators, Design and Characterization of Emitter-Coupled Transistor Pairs, Tuned Amplifier and Oscillator, Design of Oscillators.

### **Recommended Books:**

1. Thomas Floyd, *Electronics Fundamentals: Circuits, Devices, and Applications*, Latest Edition, Prentice Hall, ISBN10: 0131111388, ISBN-13: 9780131111387
2. Thomas Floyd and David Buchla, *Basic Operational Amplifiers and Linear Integrated Circuits* Latest Edition , Prentice Hall, ISBN10: 0130829870, ISBN-13: 9780130829870
3. Sidra and Smith, "Microelectronics". Latest Edition

**Objective:**

To introduce engineering drawing & simulation concepts using various tools.

**Lab Outline:**

Introduction to computer-aided design tools including AutoCAD, OrCAD, MATLAB, LabVIEW, and PCAD. Provide an understanding of computer-aided drafting principles and practices, and provide knowledge of engineering drawing fundamentals using AutoCAD. Drawing of electrical machinery and layouts of electronic assemblies. Study of theoretical concepts of electronic components and circuits using simulation softwares: Electronic Workbench, PSPICE, MATLAB, and LabVIEW. Design of electronic circuits theoretically and by simulation. Provide knowledge of design and layout of circuit boards using softwares: PCAD or OrCAD.

**Recommended Books:**

Matlab for Engineers ?

**Objective:**

To introduce the concepts of probabilistic methods and its applications to telecommunications.

**Course Outline:**

Basic concept of probability, conditional probability, independent events, Baye's formula. Concept of random variables, discrete and continuous one and two dimensional random variables, probability distributions, marginal and joint distributions and density functions. Important probability distributions (Binomial, Poisson, Uniform, Normal, Exponentials and Hyper-geometric). Mean, variance, moments and moment generating functions, linear regression and curve fitting. Central limit theorem, autocorrelation and cross-correlations, power spectral density functions and stochastic processes.

**Recommended Books:**

1. J. Devore, *Probability and Statistics*, Latest Edition, John Wiley & Sons, ISBN:
2. Ronal Walpole, *Probabilty methods for engineering and scientists*, Latest Edition, McGraw-Hill, ISBN:
3. A. Popoulis and U, Pillai, *Probability, Random Variable and Stochastic Processes*, Latest Edition, McGraw-Hill, ISBN: 0071199810

**Prerequisite: Differential Equations****Objective:**

To provide the foundation for Signal processing & telecom systems concepts.

**Course Outline:**

Introduction to signals and systems, Complex Number Applications, Time-domain Analysis of LTI systems, Laplace Transform and its applications, Continuous-time Fourier series, Fourier Transform-Frequency domain Analysis, Z-Transform and its applications, Analogue filter fundamentals.

**Recommended Books:**

1. Alan V. Oppenheim, *et al.*, "Signals and Systems," latest Edition.
2. Simon Haykin, "Signals and Systems," latest edition

**Prerequisite: Differential Equations****Objective:**

To introduce the basic concepts of feedback & control in the analysis & design of telecommunication system

**Course Outline:**

Classification of Open and Closed Loop control, Advantages and disadvantages, Effects of feedback, examples including servomechanism, system model and characterization, Block diagrams and canonical form, Examples of control systems from Telecom applications such as satellite tracking, LNAV/VNAV in aviation, Flight control systems, Heading tracking, Signal flow graphs, DE and Laplace Transforms, Transfer function, poles and zeros, Time domain analysis, steady state error using static error coefficient method, dynamic error constant method, Feedback characteristics of control systems, Sensitivity of control systems, Basic action of Controllers (Proportional, Integral, PI and PID controllers), Stability assessment (Routh, Bode, Nyquist, Nicholes chart), Compensation and compensator design for Telecommunications applications, state space.

**Recommended Books :**

1. Control Systems by Smarjit Ghosh
2. R. C. Dorf "Control systems by  
**Elec cc pg 48**



**Prerequisites:** TE313 Probability Methods in Engineering

**Objective:**

To introduce the basic concepts behind Linear & Non Linear Modulation Scheme & Noise

**Course Outline:**

Introduction to Communication Model, Essential BW of signal, Shanon's equation, Distortion and equalization (With a brief introduction of Fourier analysis, convolution and correlation concepts if required), linear modulation (AM and its types), Exponential Modulation, Demodulation and detection techniques, Transmission BW for AM & FM signals, Pre-emphasis and de-emphasis circuits, Pulse Modulation and Demodulation, Fundament concepts of probability and random processes, Noise and its treatment, SNR of AM and FM

**Lab Outline:**

Following the theoretical guidelines do the practical for various analog modulation schemes and other techniques such as AM, FM, and Angle modulation and their waveform generations through circuits/modules etc. Design example of performance comparisons of linear modulation schemes based on SNR calculations and an investigation into the noise characterizations.

**Recommended Book:**

1. B.P. Lathi, Modern Analog and Digital Communications, Latest Edition.
2. L. W. Couch II, *Digital and Analog Communication Systems*, 6<sup>th</sup> Ed. 2003. ISBN: 0135990289.
3. S. Haykin, *Communication Systems*, Latest Edition, ISBN:
4. A.B Carlson, "Communication Systems," latest edition

**Prerequisite:** Communication Systems (TE335)

**Course Outline:**

Significance of Digital Communication, Base Band Modulation, Analogue To Digital Conversion, Sampling Theory and Its Application, Quantization and Its Types (Uniform and Non-Uniform Quantization), Pulse Code Modulation, Differential PCM, Delta Modulation, ADPCM, PCM Pulse – Shaping, Inter-Symbol Interference, Equalization, Synchronization, Basic Detection Theory and Optimum Receiver Design, Multiplexing, TDM, FDM, T-1 Systems and Hierarchy, E-1 Systems Hierarchy, Digital Modulation Techniques, Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), and Phase Shift Keying (PSK, DPSK, DEPSK, QPSK), Differential

Encoding and M-Ary Signaling, Performance of Binary and M-Ary Signalling, Performance comparisons of modulation schemes, Forward Error Correction Codes, Basic concepts of information and coding.

### **Lab Outline: Simulation using MATLAB**

Following the theoretical guidelines do the practical for various modulation schemes and other techniques such as PCM, Delta modulation, PSK, DPSK and QPSK etc. An design example to do performance comparisons of various modulation schemes based on bit error rate calculations or PSD plots.

### **Recommended Books:**

1. B. Sklar, Digital Communications, 4<sup>th</sup> Edition, 2003, Prentice Hall ISBN:
2. L. W. Couch II, *Digital and Analog Communication Systems*, 6<sup>th</sup> Ed. 2003. ISBN: 0135990289.
3. S. Haykin, *Communication Systems*, Latest Edition, ISBN:

**Prerequisite: EE224 Signals and Systems**

### **Course Outline:**

Introduction, Discrete-time signal and its representations, Discrete signals and systems, Time-domain analysis of discrete-time signals, Frequency-domain analysis, Discrete-time Fourier series, Discrete-time Fourier transform, System response and frequency response, Z-transform and its properties, Solution of difference equations using Z-Transform, DFT and FFT algorithms, Implementation of Discrete-Time systems, Digital filter design, FIR and IIR filters.

### **Lab Outline:**

Using any DSP processor or trainer perform the practicals based on theory syllabus

### **Recommended Books:**

1. John G. Proakis *et al.* "Digital Signal Processing- Principles, Algorithms and Applications" latest edition
2. Alan V. Oppenheim *et al.* "Discrete-Time Signal Processing," latest edition

**Prerequisite: TE336 Digital Communications**

**Course Outline:**

Synchronous and asynchronous communications, Modes of transmission ASCII codes and data stream with parity, Guided Transmission Media (Twisted Pair, Coaxial Cable and Optical Fibre), Wireless (terrestrial and satellite). Line Configurations, Null Modem, Data Link Control, Flow Control Techniques, Stop & Wait, Sliding Window, Error control techniques, reverse error detection techniques (parity, CRC), switched networks (circuit switched, message switched and packet switched), Broadcast n, Packet Radio Networks, Network Topologies, LAN Architecture, LAN System & Network Standards, Ethernet and Fast Ethernet (CSMA/CD), Token Ring And FDDI etc., OSI Model, TCP/IP protocol suit, Introduction to IEEE802 Family. Connectivity Devices (modems, hubs, repeaters, bridges, routers), Resource Sharing, Managing User Accounts And Group, Implementing Security, Disaster Recovery, Protecting Data, Recovering From System Failure.

**Lab Outline:**

Ethernet star network performance using simulation software, asynchronous, making of different connectors, router configuration, etc.

**Recommended Books:**

1. A. S. Tananbaum, *Computer Networks*, Latest Edition, Prentice Hall, ISBN:
2. W. Stallings, *Computer Networks*, 6<sup>th</sup> Edition Prentice Hall, ISBN:
3. Driscoll, *Data Communications*, latest Edition. ISBN:
4. D. E. Comer, *Data & Computer Networks*, Latest Edition Prentice Hall. ISBN:

**Prerequisite: PH103 Applied Physics, MA102 Multivariable Calculus**

**Course Outline:**

Review of Vector Analysis, Orthogonal Coordinates Systems, Vector Calculus, Gradient Divergence and Curl, Helmholtz Theorem, Divergence theorem and applications, Stokes theorem and applications, Greens's Theorem and applications, Coulomb's Law, Gauss Law, Electric Flux Density, Poisson's Value Problems, Magnetic Fields, Current Density, Biot-Savart Law, Vector Magnetic Potential Magnetic Field Intensity, Boundary Conditions, Maxwell's Equations In Integral and Point Form, Poynting Vector, Plane Wave and Propagation In Isotropic Media.

**Lab Outline: Simulation using MATLAB.**

### **Recommended Books:**

1. J. D. Kraus, *Electromagnetics*, 2<sup>nd</sup> edition, John Wiley & Sons, ISBN:
2. Cheng, *Fundamentals of Engineering Electromagnetics*, Addison Wesley, ISBN:0-201-56611-7

## **TE324 Wave Propagation & Antennas**

3 + 1

**Prerequisite: TE323 Electromagnetic Theory, EE213 Network Analysis**

### **Course Outline:**

Standard Line Equation, Distributed Parameters, Characteristic Impedance, Concept of Standing and Travelling Waves On Transmission Line, Reflection (Partial and Total), Standing Wave Ratio, Matching Smith Chart and Its Applications, Isotropic Antenna, Power Radiated From Short Electric Dipole, Voltage Received In Antenna, Half Wave Dipole, Loop Antenna, Radiation Pattern, Intensity and Resistance, Calculation of Antenna Gain and Efficiency, Effective Aperture, Relation Between Gain and Aperture, Antenna Impedance, Bandwidth, Polarization, Beamwidth, Antenna Arrays with Isotropic Antennas, Pattern Multiplications, Width of Major Lobe and Directivity of Antenna Arrays, Binomial and Chebychev Arrays, Folded Dipole Antenna, Yagi Antenna, Log Periodic Antenna, Parabolic Reflector, Horn Antenna, Feed Systems, Lens Antennas, Cabinet's Principle and Slot Antenna, Antenna On A Flat Earth, Spherical Earth, Angle of Tilt, Field Strength, Attenuation In Ground Wave Propagation, Bending of Waves, Skip Distance, MUF, Optimum Working Frequency, Critical Frequency, Virtual Height, and Ionosphere Irregularities, Ranges, Field Strength, Inversion of Layers, Line-of-Sight Communication.

### **Lab Outline:**

Practical Demonstration of Wave propagation using trainer and through simulation using numerical electromagnetic software (Microwave Office, IE3D etc.). Practical demonstration of antennas (various types). Calculation of VSWR, Smith chart evaluations and S-parameter understanding.

### **Recommended Books:**

1. J. D. Kraus, *Electromagnetics*, 2<sup>nd</sup> edition, John Wiley & Sons, ISBN:
2. Cheng, *Electromagnetics*, Latest Edition. ISBN:
3. C. A. Ballanis, *Antennas*, 3<sup>rd</sup> Edition, John Wiley & Sons. ISBN:

**Prerequisites:** TE335 Communication Systems  
TE336 Digital Communications

### Course Outline:

Transmission Systems including PDH and SDH, Synchronization, routing techniques, Line Encoding Techniques (HDB3, 2B1Q), Types of Switching Review of switching technologies – Circuit, Message and Packet Switching, Telecommunication Network (PSTN, PLMN), Exchanges Hierarchy, Basic Functions of a Typical Digital Switching Exchanges (examples taken from EWSD, AXE, SYSTEM12 etc), SPC, Software Structure of SPC Digital Switches, Software Life Cycle, Telecommunications Traffic and models including characterization of PABX and Public exchange traffic, GOS, BHCA, Network Traffic Load and Parameters, Blocking Probabilities, Modeling Switching Systems, Incoming Traffic and Service Time Characterization, Blocking Models and Loss Estimates, Delay Systems, Time and Space Switching, T-S-T and S-T-S Systems and its variations, Numbering Plans, Routing Tables, Charging Plans, Call detail recording(CDR), numbering plans, Classifications of Signaling Systems, Channel Associated Signaling (CAS) and Common Channel Signaling (CCS) ITU's Common Channel Signaling System # 7 (CCS7 Or SS7), – protocol Architecture mapping with OSI model, MSU, LSSU, and FISU, Global title translation, ISUP and TUP protocol maps, Case Study of FMM on Call Scenarios such as prefix Analysis and task element definition(PATED), isolation of condensed prefix(CPX), DNEU and Index, LSIF, TRA and Private Access Resource Management. ISDN Implementation in Commercial Exchange.

### Recommended Book:

1. Bellamy, *Digital Telephony*, Latest Edition. ISBN:
2. M. T. Hills, *Telecommunication Switching Principles*, Latest Edition. ISBN:
3. R. Manterfield, *Telecommunication Signaling*, IEEE Press, Latest Edition. ISBN:

*EE 2/3XX ID Elective I* 3 + 1

*EE 2/3XX ID Elective II* 3 + 1

*TL 3XX MBC Breadth Elective I* 3 + 1

*TL 3/4XX MBC Breadth Elective II* 3 + 1

*TL 4XX MBC Depth Elective I* 3 + 1

*TL 4XX MBC Depth Elective II* 3 + 1

**Outline:**

To give the Students a chance for enhancing their Technical capabilities by Implementing their theoretical and practical knowledge in the field of Research and Development

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To give the Students a chance for enhancing their Technical capabilities by Implementing their theoretical and practical knowledge in the field of Research and Development

## List of ID Electives

**MA311** *Numerical Methods in Engineering*

3 + 0

### **Course Outline:**

Floating Point number system. Error analysis. Solutions of equations. Interpolation. Splines. Numerical differentiation and integration. Numerical methods in linear algebra, system of linear equations, method of least squares, eigen values, eigenvectors. Solution of ordinary and partial differential equations. This subject is to be supplemented with extensive computer exercises.

### **Recommended Books:**

1. Erwin Kreyszig, *WIE Advanced Engineering Mathematics*, Ninth Edition, International Edition, John Wiley & Sons, ISBN-10: 0-471-72897-7

**IDXXX** *Operating Systems*

3 + 1

### **Objective:**

To provide concepts of different operating systems.

### **Course Outline:**

Overview of computer system and operating system, Process description and control, Process scheduling, Threads, Symmetric Multiprocessing, Mutual exclusion & critical section, Lost update problem, Busy waiting vs. blocking, Peterson's algorithm, Interrupt disabling and spin lock, Semaphore, Partitioning, paging and segmentation, Virtual memory, Address translation and page fault handling, page table and Translation Look aside Buffer, Memory management algorithms: fetch policy, replacement policy, resident set management, I/O devices, Organization of I/O function, I/O buffering, Disk scheduling, RAID, Organization of files and directories, Secondary storage management, file systems: FAT and NTFS, Modern Operating systems

### **Recommended Books:**

1. Andrew Tanenbaum and Albert Woodhull, "Operating Systems Design and Implementation," Third Edition, 2006, Prentice Hall, ISBN: 0131429388.
2. Andrew Tanenbaum, "Modern Operating Systems," Second Edition, 2001, Prentice Hall, ISBN: 0130313580.
3. Operating System by William Stalling
4. Operating system by Albert shilberschatz latest edition

**Prerequisite: CS110 Introduction to Computing**

### **Course Outline:**

Fundamental data structures, data types, abstract data types, user defined data types, algorithms and their complexity, time-space trade off, arrays, records and pointers, matrices, linked lists, circular lists, two way lists, sequential (array) and linked implementation of stacks and queues, polish notation, recursion, towers of Hanoi, recursive implementation of stacks and queues, priority queues, tree, binary tree, binary search tree, traversals, threaded trees, heap, general trees, graphs, depth-first/breadth first traversal, adjacency matrix, shortest distance algorithms, sorting (insertion sort, selection sort, merge sort, radix sort), hashing, searching: (linear search, binary search, depth first /breadth first search.

### **Lab Outline:**

Implementation using simple programs for basic arrays, single dimensional arrays, two dimensional arrays, various algorithms implementation, Implementation of simple data structure like array, implementation of stacks, queues and priority queues, linked list, doubly linked list, circular linked list, tree searching algorithms, hash algorithms implementation, simple sorting techniques including bubble sorting and selection sorting. Advanced searching schemes including binary searching and quick searching.

### **Recommended Books:**

1. Robert Lafore, *Data Structures and Algorithms in Java*, Second Edition, 2003, Prentice Hall, ISBN: 0-672-32453-9, ISBN-13: 9780672324536
2. Robert Lafore, *Object-Oriented Programming in C++*, Fourth Edition, 2002, Prentice Hall, ISBN: 0672323087, ISBN-13: 9780672323089

### **Course Outline:**

Introduction to Artificial Intelligence, Basic elements of AI, history, applications and classification of techniques used. Production Systems and Search: Definition and examples of Production Systems. State Space Search: graph theory, strategies (data driven, goal driven), techniques (depth first, breadth first, etc.). Heuristic Search: definitions, techniques: hill climbing etc. Knowledge Representation: Knowledge representation issues, Procedural Knowledge Representation vs. Declarative Knowledge, Reasoning. Facts, Representing Knowledge using Rules, Logic Programming. Common Sense and Statistical Reasoning: Nonmonotonic reasoning and modal logic for nonmonotonic reasoning. How to deal with



Agents and their Beliefs. Use of Certainty Factors in Rule-Based Systems. Associating probabilities to assertions in first-order logic. Bayesian Networks. Expert Systems: Components of expert systems, development methodology (selection of problems, knowledge engineering), types (rule based, model based, case based), knowledge representation (rules, semantic networks, frames), inference, forward chaining, backward chaining, production systems and rule based expert systems. goal driven problem reasoning, data driven reasoning.

### **Lab Outline:**

Programming in Prolog or Lisp. Exercises of AI in Prolog or Lisp. Development of Expert System.

### **Recommended Books:**

1. Artificial Intelligence: A Modern Approach, 2nd Ed., [Stuart J. Russell](#) and [Peter Norvig](#), Prentice Hall, 2002, ISBN: 0137903952.
2. Artificial Intelligence, 2nd Ed., [Elaine Rich](#) and [Kevin Knight](#), McGraw-Hill 1990, ISBN: 0070522634
3. Artificial Intelligence in Engineering Approach, R. J. Schalkoff, McGraw Hill, 1990, ISBN: 0070550840
4. Introduction to Expert Systems, 3rd Ed, [Peter Jackson](#), Addison Wesley, 1998, ISBN: 0201876868
5. Prolog Programming for Artificial Intelligence, 3rd Ed., [Ivan Bratko](#), Addison Wesley 2000, ISBN: 0201403757

### **Course Outline:**

Precision measurements terminologies including resolution, sensitivity, accuracy, and uncertainty. Instruments for measurement of electrical properties, pressure, temperature, position, velocity, flow rates: mass and volume, and concentration. Modern instrumentation techniques. Static and dynamic responses of instrumentation and signal conditioning.

**Data acquisition systems:** Principles of operation, construction and working of different analog and digital meters, oscilloscope, recording instruments, signal generators, transducers, and other electrical and non-electrical instruments. Types of bridges for measurement of resistance, inductance, and capacitance.

Open & Closed Systems, Introduction to feedback and feedforward Control Systems, Block Diagram, Mathematical models of control systems, Transfer function, fundamentals and applications of closed loop control, frequency response analysis, transfer function analysis, modeling Topologies, Stability Analysis ( Bode Plots, Nyquist, Rowth Hurwitz, Root Locus, M&N circles, etc) Frequency Response, design procedure and specification, State Space Diagrams, Compensator design PID Controllers.

## Lab Outline:

Design, construction, and analysis of measurement circuits, data acquisition circuits, instrumentation devices, and automatic testing. Measurement of electrical parameters using different lab instruments. Calibration of measurement instruments. Use of data acquisition systems for presentation and interpretation of data. Use of microcomputers to acquire and process data. Use of simulation and instrumentation languages (LabVIEW). Simulation of Systems in MATLAB using Modeling, Their Control using feedback, Transfer functions & Stability.

## Recommended Books:

1. Klaas B. Klaassen and Steve Gee, *Electronic Measurement and Instrumentation*, 1996, Cambridge University Press, ISBN-10: 0521477298, ISBN-13: 9780521477291
2. Process control Instrumentation technology by Johnson
3. Modern Control Systems by Dorf Bishop (8<sup>th</sup> Edition)
4. [Howard M. Berlin](#) and [Frank C. Getz](#), *Experiments in Instrumentation and Measurement*, 1988, Merrill Publishing Company, ISBN: 067520450X
5. Modern Electronic Instrumentation and Measurement Techniques, Second Edition, A. D. Helfrick and W. D. Copper, Prentice Hall 1989, ISBN: 0135932947
6. Instrumentation, 2nd Edition, B. E. Nolingk, Butterworth Heinemann, 1995
7. [Kevin James](#), *PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control*, 2000, Newnes, ISBN: 0-7506-4624-1

**Prerequisite:** EE431 Digital Signal Processing

## Course Outline:

Image formation process, types of images (Infrared, Thermal and Video range etc.), image segmentation, Hough transform, shape from stereo, motion and shading. Image acquisition techniques, digitization, acquisition flaws, image storage, compression techniques, image transformation (translation, scaling, rotation, stereo, 3D modeling , discrete time description of signals , fast Fourier transform image enhancement image histogram, contrast enhancement, histogram manipulation , thresh holding, binarization, Grey scale and color images, smoothing, sharpening, edge detection, morphological operators ( erosion, dilation, opening, closing) medical axis transform, skeletonization, thinning.

**Recommended Books:**

1. Rafael Gonzalez and Richard Woods, *Digital Image Processing*, Second Edition, 2002, Prentice Hall, ISBN-13: 9780201180756
2. Anil Jain, *Fundamentals of Digital Image Processing*, First Edition, 1989, Prentice Hall, ISBN-13: 9780133361650

**EE3XX Digital Electronics****3 + 0****Prerequisite: Electronic Engineering, Network Analysis****Course Outline:**

Transistor Inverter Design and Analysis, Noise Margin, Fan Out, Propagation Delay Switching Speed, Multi Vibrators, Schmitt Trigger, Precision Timing Circuits, Sweep Generators, Digital Logic Families, DTL, TTL, ECL, IIL and CMOS, Transfer Characteristics, Speed, Power Consumption, Introduction To Fabrication of Digital Microelectronics PMOS, NMOS, CMOS A/D and D/A Converters, Design Methodologies for Combinational and Sequential Circuits, Finite State Machine, Sequential Machines, Bussing and Sequencing of Control.

**Recommended Books:**

1. Digital systems by Floyd
2. Electronic Circuits: Discrete and integrated by Schilling and Belove

**EE4XX Multimedia Systems****3 + 0****Prerequisite: CS105 Introduction to Communication****Objective:**

The objective of this course is to study various media types including text, images, speech, audio and video and compression techniques.

**Course Outline:**

Introduction to Multimedia Systems, Multimedia Networks and applications, Networking Terminology, Digitizing Principles, Text, Image Audio, Video Information representation, Text and Image Compression techniques (JPEG,MPEG), Audio and Video Compression Standards for multimedia communication.

**Recommended Books:**

1. Multimedia Communications Applications, Networks, Protocols and Standards by Fred Halsall.

**Prerequisite:** EE210 Digital Logic Design

### **Course Outline:**

Introduction, Digital Design and FPGA, FPGA based System Design, Manufacturing Process, Transistor Characteristics, CMOS Logic Gates, Wires, Registers and RAM, Packages and Pads, FPGA Architectures, SRAM Based FPGAs, Permanently Programmed FPGAs, Circuit Design of FPGA Fabrics, Architecture of FPGA Fabrics, The Logic Design Process, Combinational Network Delay, Power and Energy Optimization, Arithmetic Logic Elements, Logic Implementation using FPGAs, Physical Design (PnR) for FPGAs, Synthesis Process, Sequential Design Using FPGAs, The Sequential Machine Design Process, Sequential Design Style, FSM Design, ASM Design.

### **Lab Outline:**

Introduction to Verilog HDL, Gate Level Modeling, Data Flow Modeling, Behavioral Modeling, Design, Simulation of a Combinational Circuit, Synthesis and Fitting of a Combinational Circuit, Design and Implementation of an FSM and Memory.

### **Recommended Books:**

1. Wayne Wolf, *FPGA-Based System Design*, First Edition, 2004, Prentice Hall, ISBN-13: 9780131424616
2. Application Specific Integrated Circuits (ASICs) by M. J. Smith, published by Addison-Wesley, USA, 1997
3. Digital Systems Design and Prototyping, using Field Programmable Logic and HDLS by Zoran S. and Asim S., published by Kluwer Academic Publishers, 2000.
4. Verilog HDL, A Guide to Digital Design and Synthesis by S. Palnitkar published by Prentice Hall, USA, 1996
5. Michael Ciletti, *Advanced Digital Design with the Verilog HDL*, First Edition, 2003, Prentice Hall, ISBN-13: 9780130891617

**Prerequisite:** Electromagnetic Theory (TE335), Wave Propagation and Antennas (EE224)

### Course Outline:

Resistors, capacitors and inductors at RF frequencies; Resonant Circuits; Passive Filter Design; Impedance Matching, Impedance Matching on Smith chart. Transistor at RF frequencies; Small signal RF amplifier design, RF power amplifier. Communication at RF and Microwave frequencies. Transmission lines and waveguides, types of waveguides (rectangular and circular etc.) Strip line, Slot line, Standing Wave Ratio (SWR);

Microwave devices and circuits: Directional couplers, isolators, circulators. TWTs, Gunn diode, Impatt diode, PIN diode. Tunnel Diode Microwave mixers and detectors.

### Lab Outline:

Following the theoretical guidelines. Strip line and Slot line practical demonstration. Practicals on waveguides and microwave detectors. Smith chart computation etc.

### Recommended Books:

1. B. Sklar, Digital Communications, 4<sup>th</sup> Edition, 2003, Prentice Hall ISBN:
2. L. W. Couch II, *Digital and Analog Communication Systems*, 6<sup>th</sup> Ed. 2003. ISBN: 0135990289.
3. S. Haykin, *Communication Systems*, Latest Edition, ISBN:

**Prerequisite:** TE336 Digital Communications

### Course Outline:

Evolution of Mobile Communications, Mobile communications principles, Fading channels, Fading channel models (Rayleigh, Ricean etc.). Fading channel characterization. Introduction to Cellular Communications, Principles of Cellular system concepts and performance improvement techniques. Technical Features of AMPS. Principles and Regulations (GSM Standards from ETSI), 3GPP Standards R-99 upto release 4), Technical Features of AMPS. Introduction to GSM System, Physical layer, Functional and protocol architecture of GSM/GPRS, Enhanced data Rates for GSM Evolution (EDGE), Architecture of UMTS. Systems and Protocol Architecture (e.g. IPv4 – IPv6, UTRAN), Emerging Wireless Communication Technologies. Spread spectrum communications and

Introduction to CDMA Systems, IS-95 Standard. Third Generation Wireless Communication Standards (CDMA2000 and UMTS). Functional.

### **Lab Outline:**

Following the theoretical outlines.

### **Recommended Books:**

1. T. S. Rappaport, *Wireless Communications: Principles & Practices*, 2<sup>nd</sup> Edition, Prentice Hall, 2003 ISBN:
2. M. R. Karim, Mohsen Sarraf, *WCDMA & CDMA 2000 for 3G Mobile Networks*, Latest Edition McGraw-Hill, ISBN:

**TL4XX Satellite Communications**

**3 + 1**

**Prerequisite: EE431 Digital Signal Processing**

### **Course Outline:**

Principle of Satellite Communication: Introduction & Historical background, need of Satellite Communication, uplink & downlink frequencies, synchronous satellite, international regulation & frequency coordination, satellite frequency allocation & band spectrum, general & technical characteristics of satellite communication signal, advantages & disadvantages of satellite communication, active & passive satellites.

Orbits and Launching Methods: Introduction, Kepler's first law, Kepler's second law, Kepler's third law, definitions of terms for earth orbiting satellites, orbital elements, apogee and perigee heights, orbital perturbations, effects of non-spherical earth, atmospheric drag, the geostationary orbit, antenna look angles, polar mount antenna, limits of visibility, earth eclipse of satellite, sun transit outage, launches & launch vehicles.

Polarization: Definitions, antenna polarization, polarization of satellite signals, cross polarization discrimination, ionospheric depolarization, rain depolarization, ice depolarization.

The Space Segment: Introduction, power supply, altitude control, station keeping, thermal control, TT&C subsystem, transponders, antenna subsystem. The Earth Segment: Introduction, receive-only home TV systems, transmit/receive earth stations.

The Space Links: Introduction, equivalent isotropic radiated power, transmission losses, link power budget equation, system noise, carrier-to-noise ratio. Interference: Introduction, interference between satellite circuits, combined (C/I) due to interference on uplink and downlink, antenna gain function, pass band interference.

Satellite Access & Services: Introduction, signal access, multiple access, Introduction to FDMA/TDMA, pre-assigned FDMA, demand-assigned FDMA, pre-assigned TDMA, demand-assigned TDMA, satellite-switched TDMA, code-division multiple access. Introduction, direct broadcast satellite (DBS) services, MSAT, VSATs, GPS.

### **Lab Outline:**

Practicals aimed at antennas and other satellite earth segment equipments

### **Recommended Books:**

1. Maral G., "Satellite Communication".
2. M. Richharia,, "Satellite Communication Systems", 2<sup>nd</sup> Ed.
3. \*\*\*\*, "ITU Handbook on Satellite Communication", Wiley 3<sup>rd</sup> Ed.
4. Kadish J.E. and East T.W.R., "Satellite Communication Fundamentals", Artech House Books.
5. Praut T., "Satellite Communication".Edition, John Wiley & Sons, ISBN: 0-471-46482-1

## **TL4XX    *Optical Fiber Communication***

**3 + 1**

### **Course Outline:**

Introduction to Optical fiber Communications, Basic principles, snells law, Numerical aperture (NA),fresnel loss, fiber types, single mode and multimode, optical fiber losses, (attenuation, dispersion, polarization), special optical fibres, Light sources (LED, LASER), light detection (p-i-n and APD), components and connectors, Link budget calculations (power based and rise time based), Reciever design considerations (IM/DD and Coherent systems), modulation schemes, optical measurement (OTDR e.g) Optical DWDM systems, Examples from commercial implementations e.g TAT-9 and TAT-14.

### **Recommended Books:**

1. "Understanding Optical Communications", Harry Dutton
2. John Senior, *Optical Fiber Communications*, second Edition
3. Govind P. Agrawal, *Fiber-Optic Communication Systems*, Third Edition, 2002, John Wiley & Sons, ISBN-10: 0-471-21571-6
4. Joseph Palais, *Fiber Optic Communications*, Fifth Edition, 2005, Prentice Hall, ISBN-13: 9780130085108

## **TL4XX    *Telecom Traffic Engineering***

**3 + 0**

**Prerequisite: EE210 Digital Logic Design**

### **Course Outline:**

Introduction: Basic concepts, Poisson process, Markov processes, Birth-death processes Purpose of Teletraffic Theory, Teletraffic models, Classical model for telephone traffic, Classical model for data traffic.  
Modeling: Telecommunication networks, Network level: switching and routing, Link level: multiplexing and concentration, Shared media: multiple

access. Circuit switched network modeled as a loss network, Packet switched network modeled as a queuing network. Traffic measurements, Traffic variations, Traditional modeling of telephone traffic, Traditional modeling of data traffic.

Performance analysis: Simple teletraffic model, Poisson model, Erlang model. Binomial models, Engset model M/M/1 (1 server,  $\infty$  waiting places), M/M/n (n servers,  $\infty$  waiting places). Introduction, Generation of traffic process realizations, Generation of random variable realizations, Collection of data, Statistical analysis.

Network planning and dimensioning: Introduction, Network planning, Traffic forecasts, Dimensioning.

Traffic management: Traffic and congestion control in ATM; Introduction, ATM technique, Service categories and traffic contract, Traffic and congestion control in ATM, Connection Admission Control (CAC) and Usage Parameter Control (UPC), ABR flow control.

Traffic and congestion control in the Internet: Introduction, IP-networks, Traffic and congestion control in the Internet, QoS architectures in the Internet.

### **Recommended Books:**

1. Villy B. Iversen, "Teletraffic Engineering Handbook", ITU, [www.tele.dtu.dk/teletraffic](http://www.tele.dtu.dk/teletraffic) .
2. Thiagarajan Viswanathan, "Telecommunication Switching Systems and Networks", Prentice Hall India.
3. Papoulis A., "Probability, Random Variables, and Stochastic Process", Mc-Graw Hill.
4. Davenport W.B., "Probability and Random Process", Jr. Mc-Graw Hill.

### **Course Outline:**

Introduction: Radar Block Diagram & Operation, Radar Range Equation, Radar Frequencies, Radar Parameters: Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Signal to Noise Ratio, Integration of Radar pulses, Radar Cross Section, Transmitter Power, Antenna Parameters, System Losses, Propagation Effects, Radar Clutters.

Radar Types: CW and Frequency Modulated Radar, MTI and Pulse Doppler Radar, Tracking Radar.

Components of Radars: Radar Transmitters, Radar Antennas, Receivers, Displays and Duplexers.

Detection of Radar Signals in Noise: Detection Criteria, Detector Characteristics, Performance of Radar Operator, Automatic Detection



**Recommended Books:**

1. Skolnik M.I., "Introduction to Radar System", McGraw Hill, Latest Ed.
2. Burtan R., "Radar Engineering", McGraw Hill, Latest Ed.

**TL4XX**      *Spread Spectrum Communications*      3 + 0

**Course Outline:**

Introduction to spread spectrum communications. Principles of FH and DS system. Types of spread spectrum communications. Basic transceiver of DS/FH systems. Application of spread spectrum communications (satellite, military communications etc.). Application in Jamming: Narrowband and wideband jammers. Pseudo noise codes in spread spectrum systems. M-sequence codes, Walsh Codes, Gold Codes.

Introduction to code-division multiple access (CDMA) systems. IS-95 Standard and 3G systems (such as CDMA 2000 and WCDMA systems). Functional architecture of 3G wireless communications systems.

**Recommended Books:**

1. A. J. Viterbi, *Principle of Spread Spectrum Communications*, Wiley, 1995
2. P. Zeimer, *Introduction to spread spectrum communications*, Wiley, 2002

**TL4XX**      *Network Security*      3 + 1

**Course Outline:**

Conventional Cryptography, Modern Cryptography, Private and Public Key Encryption, Encryption Algorithms, Key Distribution Problem, Authentication and digital Signatures, Pseudo-random number generation and its computational complexity, Speech Cryptography, Speech Scrambling Techniques, Virus protection diagnosis and remedies, Firewalls, Spy wares.

**Lab Outline:**

Programming in real time processing in MATLAB or on any other platform. Hardware trainers/equipment for experiments.

**Recommended Books:**

1. William Stalling, "Cryptography & Network Security," latest edition
2. Bruce Schenier, "Applied Cryptography" latest edition

**Course Outline:**

Introduction: Radar Block Diagram & Operation, Radar Range Equation, Radar Frequencies, Radar Parameters: Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Signal to Noise Ratio, Integration of Radar pulses, Radar Cross Section, Transmitter Power, Antenna Parameters, System Losses, Propagation Effects, Radar Clutters. Radar Types: CW and Frequency Modulated Radar, MTI and Pulse Doppler Radar, Tracking Radar.

Components of Radars: Radar Transmitters, Radar Antennas, Receivers, Displays and Duplexers.

Detection of Radar Signals in Noise: Detection Criteria, Detector Characteristics, Performance of Radar Operator, Automatic Detection

**Recommended Books:**

1. Skolnik M.I., "Introduction to Radar System", McGraw Hill, Latest Ed.
2. Burtan R., "Radar Engineering", McGraw Hill, Latest Ed.

**Course Outline:**

This course has been designed to be offered as an integrated course covering any two areas of Telecommunications, as required. Half a semester is devoted to each of the chosen areas. For example the two areas could be chosen from (a) Radio and Television Engineering (b) Optical Fiber communications (c) Satellite Systems (d) Spread Spectrum Systems (e) GSM based systems (f) CDMA based systems (g) Digital Radio (h) Signaling Systems in Telecom networks (e.g CCS7) (i) Frame relay Network (j) ATM Network (k) Radar Systems.

The basic philosophy in choosing this course would be to fulfill the deficiency in the offered program in terms of market demand for particular operational knowledge within a specific area and where time and capacity is not available to deliver two separate courses. Simulation software including MATLAB, OPNET and EWB.

**Recommended Books:**

1. ISDN and Broadband ISDN with ATM and Frame relay, William Stallings (4<sup>th</sup> Ed)
2. Basic Television by Grob
3. Radar Systems by Skolnik
4. Modern Electronic Communications by Miller
5. Telecommunications by Warren Hioki

6. Optical fiber communications by John Senior
7. P. Zeimer, Introduction to spread spectrum communications, Wiley, 2002

**EE4XX Compression Techniques**

3 + 0

**Course Outline:**

Introduction, Fundamental Concepts, Classification Of Methods, Semantic Dependent Methods, Static Defined-Word Schemes, Shannon-Fano Coding, LD-CELP, Huffman Coding, Arithmetic Coding, Lempel-Ziv Codes, Algorithm BSTW, Static Codes.

**Recommended Books:**

**EE4XX Embedded Systems**

3 + 1

**Prerequisite: Microprocessor and Interfacing Techniques**

**Objective:**

The objective of this course is to implement the concepts developed in Microprocessor & Interfacing techniques course.

**Course Outline:**

Introduction to Embedded Systems, Hardware Architecture of Embedded Systems, Programming Model of Embedded Systems, I/O Port structure and Memory Organization, Serial and Parallel Interface, Timers and Interrupt Handling, Software Design for Embedded Systems, Single Board Computer, Software Development Tools, Hardware Interfacing, Introduction to AVR Microcontrollers.

**Lab Outline:**

Theory related concepts should be implemented using hardware trainers. e.g. BGC, Midas, etc.

**Recommended Books:**

1. The 8051 Microcontroller by I. Scott Mackenzie,
2. The 8051/8052 Microcontroller Architecture, Assembly Language and Hardware Interfacing by Criag Steiner
3. Architecture and Programming of 8051 Microcontrollers by Milan Verle

**Course Outline:**

Network Management in TCP/IP Environments, Network Management Station (NMS), Network Management Requirements, Fault (Configuration and Accounting), Performance & Security Management, Network Management Protocols, Abstract Syntax Notation One (ASN.1), OID/MIB, CMIS/CMIP, SNMP (V1, V2, V3), Structure of Management Information (SMI), Remote Monitoring (RMON), SNMP Commands, Telecommunications Management Network (TMN), Network Management Tools and Systems, TCL/TK Scripting for SNMP Agents.

**Recommended Books:**

1. Telecommunications Network Management, Technologies and Implementations by Salah Aidarous and Thomas Plevyak, Wiley-IEEE Press, 1997
2. Integrated Management of Networked Systems by Heinz-Gerd Hegering, Sebastian Abeck, Bernhard Neumair, Morgan Kaufmann, 1999.

**Course Outline:**

X.25, Frame Relay, Asynchronous Transfer Mode (ATM): Protocol architecture, model planes, logical connections, Control Signaling. ATM cells, Cell format, service categories, adaptation layer protocol. SDH, Broadband Technologies: B-ISDN.

Broadband ISDN: Abilities and benefits of B-ISDN, B-ISDN Network elements and structures, reference points, protocols, Functions of different Layers in B-ISDN model, Transportation of ATM cells using SDH/SONET, ATM layer in B-ISDN.

Switched Multimegabit Data Service: SMDS characteristics, network components, layers, addressing, messages, SMDS interface protocol (Level 1, 2 &3), Distributed Queue Dual Bus (DQDB) protocol.

Digital Subscriber Line: Digital Subscriber Line (DSL) introduction, architecture, DSL broadband technologies (HDSL, SDSL, ADSL, VDSL), Line Codes (QAM/CAP and DMT) in DSL, Performance issues in DSL, Network solutions based on DSL, a case study, Next generation Digital Loop Carriers.

**Lab Outline:**

Experiments on ATM, SDH and SONET, ADSL etc. using OPNET

**Recommended Books:**

1. William Stallings, "Data and Computer Communications", 7th Edition,

- Prentice Hall.
2. William Stallings, “Business Data Communications” Fourth Edition, Prentice Hall.
  3. William Stallings, “ISDN and Broadband ISDN with ATM and Frame Relay”
  4. William Beyda, “Data Communications From Basics to Broadband” Prentice Hall.
  5. Sveum, “Data Communications An Overview” Prentice Hall.
  6. Raymond Panko, “Business Data Communications and Networking” Prentice Hall.

**TL4XX** | **Telecommunication Applications in Avionics** | 3 + 0

**Course Outline:**

VOR principles and frequencies, DME principles, Radar, EFIS, TCAS, ILS Transmitter and Receiver (Cat-1, Cat-2 and Cat-3), GPS principles and frequencies, on-board transponder, SSB Receiver and Transmitter, Typical Systems on board on airborne equipment applicable to the Pakistan Aviation industry such as type 747-400, 777-200 from Boeing Corporation or similar from Airbus; Majority voting with on-board data processing systems, Reliability considerations in the design of Telecommunication Systems for avionics applications. The autopilot and its usage for waypoint tracking, altitude hold, destination airport landing on allocated runway via ILS approach. Use of appropriate simulation packages to demonstrate the use telecommunication systems on airborne systems such as VOR, HDG, DME, PFD, HSI, EFIS, EICAS, TCAS, ILS lock and tracking, error minimization in GPS tracking on a particular selected route, frequency allocation and usage for various on-board telecommunication receivers, Antenna location on airborne equipment and their applications, DSBSC/SSB receivers principles, block diagram (Balanced modulators, sideband filters, frequency translation, carrier-insertion, effect of incorrectly generated carrier with incorrect frequency and phase on received signal), AM receivers (Superhet, the IF Amplifier, Adjacent channel interference, Image channel interference, double conversion superhet, Sensitivity and selectivity, AGC and delayed AGC).

Field/flightdeck visit for students if possible arranged through the ministry of communications

**Lab Outline:**

Lab exercises on Avionics Simulator, EWB and MATLAB

**Recommended Books:**

1. Telecommunications by Miller
2. System handbook on airborne equipment

**Course Outline:**

Introduction, Basic reliability concepts, kinds of failure, the reliability function, catastrophic-failure models, combinational reliability, system reliability, effects of repair, Mathematical design, statement of design problem in mathematical terms, Yield and drift reliability, methods for computing probability of system success, Optimization techniques

**Recommended Books :**

1. Design of Systems and Circuits for Maximum reliability and production yield, by Becker and Jensen : Wiley Publishers (I.S.B.N : 0-07-004230-6)

**Prerequisite: Computer Communication & Network****Course Objective:**

Learn Recent advances in wireless communications and electronics have enabled the development of low-cost, low-power, multifunctional nodes that are small in size and communicate through short & Long distances. These nodes, which consist of sensing, data processing, and communicating components.

**Course Outline:**

Review of wireless communication fundamentals, Introduction to Wireless Networks, Wireless personal area networks (WPANS), Wireless Local Area Networks (WLANS), Wireless Metropolitan Area Networks (WMAN), Introduction to Cellular networks, Detailed study of Second generation Cellular Networks, WiMax, UMTS Overview of 3G Cellular systems, Introduction to Network Simulators

**Recommended Books:**

1. Wireless Communication Networks. By William Stalling
2. Wireless Communications: Principal & Practice by Theodore Rappaport.
3. Principal of Wireless Network: A Unified Approach By Kaveh Pahlavan, Prashant Kh Krishnamurthy

# SCHEME OF STUDIES FOR ME/MSc IN TELECOMMUNICATION ENGINEERING

The graduate degree programme ME in Telecommunication Engineering consists of total 30 credit hours (24 CH of teaching and 6 CH of Thesis). Research thesis should be a mandatory part of all ME/MS program as per HEC policies. It is the unanimous recommendation of the committee that a research handbook should be produce by the universities to guide both students and supervisors.

The committee has unanimously decided that the following scheme of studies is proposed at graduate level. The students are given flexibility and ample choice in deciding their stream of specialization offered within the program. The scheme of graduate studies offers following streams of specializations,

1. Communication Systems
2. Signal Processing
3. RF & Wireless Communications
4. Telecommunication Networks

It consists of 3 cores course, 3 specialization course and 2 elective courses that may be selected from other streams. The student has to submit a dissertation before the award of degree.

<b>Semester</b>		<b>1</b>			
<b>S. No.</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Lecture Hrs</b>	<b>Lab Hrs</b>	<b>Credit Hours</b>
1		Core I	3	0	3
2		Core II	3	0	3
3		Specialization I	3	0	3
		<b>Total</b>	<b>9</b>	<b>0</b>	<b>9</b>
<b>Semester</b>		<b>2</b>			
1		Core III	3	0	3
2		Specialization II	3	0	3
3		Elective I	3	0	3
		<b>Total</b>	<b>9</b>	<b>0</b>	<b>9</b>
<b>Semester</b>		<b>3</b>			
1		Elective II	3	0	3
2		Specialization III	3	0	3
		<b>Total</b>	<b>6</b>	<b>0</b>	<b>6</b>
<b>Semester</b>		<b>4</b>			
1		Thesis/Dissertation	6	0	6
		<b>Total</b>	<b>6</b>	<b>0</b>	<b>6</b>

# **List of Courses for ME/MSc in Telecommunication Engineering**

## **Core Courses**

Stochastic Processes  
Telecom Systems & Networks  
Advanced Digital Communication

## **Specialization (Communication System)**

Optical Fiber Communications  
Advanced Computer Networks  
Advanced Wireless Communication  
Telecom Management Network  
QOS in Telecommunication Networks  
Telecom Policies and Regulations

## **Specialization (Signal Processing)**

Advanced Digital Signal Processing  
Adaptive Signal processing  
Real Time DSP  
Digital Image Processing  
Statistical Signal Processing  
Video Signal processing  
Speech Processing

## **Specialization (RF & Wireless Communication)**

Antenna Design  
Microwave Engineering  
Advanced Engineering Electromagnetics  
Radar Engineering.  
Advanced Wireless Communication  
Mobile Communications  
Satellite Communication

## **Specialization (Telecommunication Networks)**

Mobile Ad-hoc Networks  
Optical Communication & Networks  
Advanced GSM Architecture  
Telecom Management Network  
Broadband Communication  
SS7 & Intelligent Networks  
CDMA based Networks  
Network Security  
Next Generation Networks  
Sensor Networks

## **Electives**

Research Methodology  
Simulation and modeling  
Operational Research



## **GENERAL RECOMMENDATIONS**

Any curriculum, however good it may be, needs its implementation in its true spirit to achieve its goals and objectives. The Committee has the following recommendations in this regard:

- The faculty members should pay particular attention to the development of problem-solving skills in the students from the first semester. Special assignments and mini projects may be used to achieve this objective. It should be emphasized to the students that the objective of the course and laboratory work is to develop the skills that enable them to solve real-life problems.
- The development of independent thinking and leadership skills in the students is very important. The faculty members should keep this objective in mind in the course and laboratory work, and particularly in the final year design projects.
- The final-year projects should involve analysis and design and the faculty members should encourage the students to select projects with the industry.
- The students should be required to make presentations on their projects and the people from the industry should be invited to these presentations.
- The students should get practical experience during the course of studies. The educational institutions and faculty members should help the students to get meaningful internships in the government and industry, generally in the third and fourth academic years. A formal procedure should be established which engages both faculty members and relevant people from the government and industry to review the progress of the students. The students should be required to write reports and give presentations at the end of their internships.
- Based on the recommended topical outlines given in this curriculum document, particular emphasis should be given to the “Quality Assurance Aspects” of the program through the development of Course Outlines. These course outlines should address the details of the topics the way it will be delivered in the classroom and should include Course goals, learning objectives, Scheduled Learning activities, Teaching and Learning strategies, Assessment strategies. Based on the particular choice of electives adopted at the universities, a Graduate attribute matrix should also be developed for the program on offer by the University. These measures will also help the University when applying for accreditation with the Pakistan Engineering Council.
- The core courses are recommended to be made compulsory in all universities of Pakistan and a set of electives may be chosen to fulfill the complete curriculum requirements. The electives proposed by the Committee may not be considered as complete. Universities may introduce additional electives according to the areas of expertise of their faculty members and research facilities such as laboratories.

# COMPULSORY COURSES IN ENGLISH FOR BE/BSc IN ENGINEERING DISCIPLINE

## Semester – I

### Functional English

**Objectives:** To enhance language skills and develop critical thinking

### Course Contents

Basics of Grammar  
Parts of speech and use of articles  
Sentence structure, Active and passive voice  
Practice in unified sentence  
Analysis of phrase, clause and sentence structure  
Transitive and intransitive verbs  
Punctuation and spelling

### **Comprehension**

Answers to questions on a given text

### **Discussion**

General topics and every day conversation (topics for discussion to be at the discretion of the teacher keeping in view the level of students)

### **Listening**

To be improved by showing documentaries/films carefully selected by subject teachers)

### **Translation skills**

Urdu to English

### **Paragraph writing**

Topics to be chosen at the discretion of the teacher

### **Presentation skills**

Introduction

**Note: Extensive reading is required for vocabulary building**

### Recommended books:

#### **1. Functional English**

##### **a) Grammar**

1. Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 1. Third edition. Oxford University Press. 1997. ISBN 0194313492

2. Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 2. Third edition. Oxford University Press. 1997. ISBN 0194313506
- b) Writing
1. Writing. Intermediate by Marie-Christine Boutin, Suzanne Brinand and Françoise Grellet. Oxford Supplementary Skills. Fourth Impression 1993. ISBN 0 19 435405 7 Pages 20-27 and 35-41.
- c) Reading/Comprehension
1. Reading. Upper Intermediate. Brian Tomlinson and Rod Ellis. Oxford Supplementary Skills. Third Impression 1992. ISBN 0 19 453402 2.
- d) Speaking

## **Semester II**

### **Communication Skills**

**Objectives:** To enable the students to meet their real life communication needs

#### **Course Contents**

##### **Paragraph writing**

Practice in writing a good, unified and coherent paragraph

##### **Essay writing**

Introduction

##### **CV and job application**

##### **Translation skills**

Urdu to English

##### **Study skills**

Skimming and scanning, intensive and extensive, and speed reading, summary and précis writing and comprehension

##### **Academic skills**

Letter / memo writing and minutes of the meeting, use of library and internet resources

##### **Presentation skills**

Personality development (emphasis on content, style and pronunciation)

**Note: documentaries to be shown for discussion and review**

**Recommended books:  
Communication Skills**

a) Grammar

1. Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 2. Third edition. Oxford University Press 1986. ISBN 0 19 431350 6.

b) Writing

1. Writing. Intermediate by Marie-Christine Boutin, Suzanne Brinand and Françoise Grellet. Oxford Supplementary Skills. Fourth Impression 1993. ISBN 019 435405 7 Pages 45-53 (note taking).
2. Writing. Upper-Intermediate by Rob Nolasco. Oxford Supplementary Skills. Fourth Impression 1992. ISBN 0 19 435406 5 (particularly good for writing memos, introduction to presentations, descriptive and argumentative writing).

c) Reading

1. Reading. Advanced. Brian Tomlinson and Rod Ellis. Oxford Supplementary Skills. Third Impression 1991. ISBN 0 19 453403 0.
2. Reading and Study Skills by John Langan
3. Study Skills by Richard Yorky.

**Semester III**

**Technical Writing and Presentation Skills**

**Objectives:** To enhance language skills and develop critical thinking

**Course Contents**

**Presentation skills**

**Essay writing**

Descriptive, narrative, discursive, argumentative

**Academic writing**

How to write a proposal for research paper/term paper

How to write a research paper/term paper (emphasis on style, content, language, form, clarity, consistency)

**Technical Report writing**

## **Progress report writing**

**Note: Extensive reading is required for vocabulary building**

### **Recommended books:**

#### **Technical Writing and Presentation Skills**

- a) Essay Writing and Academic Writing
  1. Writing. Advanced by Ron White. Oxford Supplementary Skills. Third Impression 1992. ISBN 0 19 435407 3 (particularly suitable for discursive, descriptive, argumentative and report writing).
  2. College Writing Skills by John Langan. Mc=Graw-Hill Higher Education. 2004.
  3. Patterns of College Writing (4<sup>th</sup> edition) by Laurie G. Kirszner and Stephen R. Mandell. St. Martin's Press.
- b) Presentation Skills
- c) Reading  
The Mercury Reader. A Custom Publication. Compiled by norther Illinois University. General Editors: Janice Neulib; Kathleen Shine Cain; Stephen Ruffus and Maurice Scharton. (A reader which will give students exposure to the best of twentieth century literature, without taxing the taste of engineering students).

**ISLAMIC STUDIES (Compulsory)****COURSE PROFILE**

S.NO	TITLES	DETAIL
1	<b>Name of Course</b>	<b>Islamic Studies( Compulsory)</b>
2	<b>No. of Credit Hours</b>	<b>2 Credit Hours</b>
3	<b>Nature of Course</b>	<b>Compulsory at Graduation Level</b>
4	<b>Total Teaching Weeks</b>	<b>18</b>
5	<b>Objectives of the Course</b>	This course is aimed at: 1-To provide Basic information about Islamic Studies 2-To enhance understanding of the students regarding Islamic Civilization 3-To improve Students skill to perform prayers and other worships 4-To enhance the skill of the students for understanding of issues related to faith and religious life
6	<b>Components of Teaching of the Course</b>	

LEVEL OF COURSE	GRADUATION
NAME OF DEGREE	BS
NAM OF COURSE	ISLAMIC STUDIES
SEMESTER	AS PER REQUIREMENT OF THE UNIVERSITY
NO. OF CREDIT	2
TOTAL TEACHING HOURS	AS PER HEC REQUIRMENTS
NO. OF PERIODS PER WEEK	2
TOTAL TEACHING PERIOD OF COURSE	18 WEEKS

**UNIT NO.1: INTRODUCTION TO QURANIC STUDIES**

- 1) Basic Concepts of Quran
- 2) History of Quran
- 3) Uloom-ul -Quran

**UNIT No.2 : STUDY OF SELLECTED TEXT OF HOLLY QURAN**

- 1) Verses of Surah Al-Baqra Related to Faith(Verse No-284-286)
- 2) Verses of Surah Al-Hujrat Related to Adab Al-Nabi (Verse No-1-18)

- 3) Verses of Surah Al-Mumanoon Related to Characteristics of faithful (Verse No-1-11)
- 4) Verses of Surah al-Furqan Related to Social Ethics (Verse No.63-77)
- 5) Verses of Surah Al-Inam Related to Ihkam(Verse No-152-154)

### **UNIT No.3 : STUDY OF SELLECTED TEXT OF HOLLY QURAN**

- 1) Verses of Surah Al-Ihzab Related to Adab al-Nabi (Verse No.6,21,40,56,57,58.)
- 2) Verses of Surah Al-Hashar (18,19,20) Related to thinking, Day of Judgment
- 3) Verses of Surah Al-Saf Related to Tafakar,Tadabar (Verse No-1,14)

### **UNIT NO.4: SEERAT OF HOLY PROPHET (S.A.W) I**

- 1) Life of Muhammad Bin Abdullah ( Before Prophet Hood)
- 2) Life of Holy Prophet (S.A.W) in Makkah
- 3) Important Lessons Derived from the life of Holy Prophet in Makkah

### **UNIT NO.5: SEERAT OF HOLY PROPHET (S.A.W) II**

- 1) Life of Holy Prophet (S.A.W) in Madina
- 2) Important Events of Life Holy Prophet in Madina
- 3) Important Lessons Derived from the life of Holy Prophet in Madina

### **UNIT NO.6: INTRODUCTION TO SUNNAH**

- 1) Basic Concepts of Hadith
- 2) History of Hadith
- 3) Kinds of Hadith
- 4) Uloom –ul-Hadith
- 5) Sunnah & Hadith
- 6) Legal Position of Sunnah

### **UNIT NO.7 SELLECTED STUDY FROM TEXT OF HADITH**

### **UNIT NO.8 INTRODUCTION TO ISLAMIC LAW & JURISPRUDENCE**

- 1) Basic Concepts of Islamic Law & Jurisprudence
- 2) History & Importance of Islamic Law & Jurisprudence
- 3) Sources of Islamic Law & Jurisprudence
- 4) Nature of Differences in Islamic Law
- 5) Islam and Sectarianism

### **UNIT NO.9: ISLAMIC CULTURE & CIVILIZATION**

- 1) Basic Concepts of Islamic Culture & Civilization
- 2) Historical Development of Islamic Culture & Civilization
- 3) Characteristics of Islamic Culture & Civilization
- 4) Islamic Culture & Civilization and Contemporary Issues

### **UNIT NO.10:ISLAM & SCIENCE**

- 1) Basic Concepts of Islam & Science
- 2) Contributions of Muslims in the Development of Science
- 3) Quranic & Science

### **UNIT NO.11: ISLAMIC ECONOMIC SYSTEM**

- 1) Basic Concepts of Islamic Economic System
- 2) Means of Distribution of wealth in Islamic Economics
- 3) Islamic Concept of Riba
- 4) Islamic Ways of Trade & Commerce

### **UNIT NO.12: POLITICAL SYSTEM OF ISLAM**

- 1) Basic Concepts of Islamic Political System
- 2) Islamic Concept of Sovereignty
- 3) Basic Institutions of Govt. in Islam

### **UNIT NO.13: ISLAMIC HISTORY**

- 1) PERIOD OF KHLAFT-E-RASHIDA
- 2) PERIOD OF UMMAYYADS
- 3) PERIOD OF ABBASIDS

### **UNIT NO.14 : SOCIAL SYSTEM OF ISLAM**

- 1) BASIC CONCEPTS OF SOCIAL SYSTEM OF ISLAM
- 2) ELEMENTS OF FAMILY
- 3) ETHICAL VALUES OF ISLAM

### **REFERENCE BOOKS:**

- 1) HAMEED ULLAH MUHAMMAD, "**EMERGENCE OF ISLAM**", IRI, ISLAMABAD
- 2) HAMEED ULLAH MUHAMMAD, "**MUSLIM CONDUCT OF STATE**"
- 2) HAMEED ULLAH MUHAMMAD, "**INTRODUCTION TO ISLAM**"
- 3) MULANA MUHAMMAD YOUSAF ISLAHI,"
- 4) Hussain Hamid Hassan, "**An Introduction to the Study of Islamic Law**" leaf Publication Islamabad, Pakistan.
- 5) Ahmad Hasan, "**Principles of Islamic Jurisprudence**" Islamic Research Institute, international Islamic University, Islamabad (1993)
- 6) Mir Waliullah, "**Muslim Jrisprudence and the Quranic Law of Crimes**" Islamic Book Service (1982)
- 7) H.S. Bhatia, "**Studies in Islamic Law, Religion and Society**" Deep & Deep Publications New Delhi (1989)
- 8) Dr. Muhammad Zia-ul-Haq, "**Introduction to Al Sharia Al Islamia**" Allama Iqbal Open University, Islamabad (2001)



## Pakistan Studies (Compulsory)

(As Compulsory Subject for Degree Students)

### Introduction / Objectives

The course has been designed as a compulsory subject for the students studying for Bachelor’s degree, general or professional. The course is of 3 credit hours carrying 100 marks (recommended). The teaching work is comprised of three dimensions: Historical Perspective (20%); Government and Politics (40%); and Contemporary Pakistan (40%).

The course framework is issue-oriented. It has many dimensions, the historical and ideological background of Pakistan the process of governance and national development as well as the issues arising in the modern, age and posing challenges to Pakistan. The course has been designed with a vision that Pakistan Studies should open a window to future.

### Course Outline

#### 1. Historical Perspective

- a. Ideological rationale with special reference to Sir Syed Ahmed Khan, Allama Muhammad Iqbal and Quaid-i-Azam Muhammad Ali Jinnah.
- b. Factors leading to Muslim separatism
- c. People and Land
  - i. Indus Civilization
  - ii. Muslim advent
  - iii. Location and Geo-Physical features.

#### 2. Government and Politics in Pakistan

Political and constitutional phases:

- a. 1947-58
- b. 1958-71
- c. 1971-77
- d. 1977-88
- e. 1988-99
- f. 1999 onward

#### 3. Contemporary Pakistan

- a. Economic institutions and issues
- b. Society and social structure

- c. Ethnicity
- d. Foreign policy of Pakistan and challenges
- e. Futuristic outlook of Pakistan

### **Books Recommended**

1. Burki, Shahid Javed. *State & Society in Pakistan*, The Macmillan Press Ltd 1980.
2. Akbar, S. Zaidi. *Issue in Pakistan's Economy*. Karachi: Oxford University Press, 2000.
3. S.M. Burke and Lawrence Ziring. *Pakistan's Foreign policy: An Historical analysis*. Karachi: Oxford University Press, 1993.
4. Mehmood, Safdar. *Pakistan Political Roots & Development*. Lahore, 1994.
5. Wilcox, Wayne. *The Emergence of Banglades.*, Washington: American Enterprise, Institute of Public Policy Research, 1972.
6. Mehmood, Safdar. *Pakistan Kayyun Toota*, Lahore: Idara-e-Saqafat-e-Islamia, Club Road, nd.
7. Amin, Tahir. *Ethno - National Movement in Pakistan*, Islamabad: Institute of Policy Studies, Islamabad.
8. Ziring, Lawrence. *Enigma of Political Development*. Kent England: WmDawson & sons Ltd, 1980.
9. Zahid, Ansar. *History & Culture of Sindh*. Karachi: Royal Book Company, 1980.
10. Afzal, M. Rafique. *Political Parties in Pakistan*, Vol. I, II & III. Islamabad: National Institute of Historical and cultural Research, 1998.
11. Sayeed, Khalid Bin. *The Political System of Pakistan*. Boston: Houghton Mifflin, 1967.
12. Aziz, K.K. *Party, Politics in Pakistan*, Islamabad: National Commission on Historical and Cultural Research, 1976.
13. Muhammad Waseem, *Pakistan Under Martial Law*, Lahore: Vanguard, 1987.
14. Haq, Noor ul. *Making of Pakistan: The Military Perspective*. Islamabad: National Commission on Historical and Cultural Research, 1993.

## **COURSES FOR SOCIAL SCIENCE**

### **Sociology and Development** (For Engineers)

Objectives: The main objective of this course is to apprise potential engineers about social factors that contribute towards enhancing their professional performance for the good of society and the country. This course is culture specific and has to be taught within the context of local and national socio-economic environment. The engineers are expected to supervise several people in different capacities and their understanding about human behaviour is critical for their optimum performance. Modification of human behaviour or getting work done from sub-ordinates and seniors remain a major challenge for all the professional engineers. This course will enhance understanding about the determinants of human behaviour, which ultimately will result in improved individual efficiency.

#### **1. Introduction to Sociology**

- 1.1 What is sociology?
- 1.2 Nature, Scope, and Importance of Sociology
- 1.3 Social Interactions
- 1.4 Social Groups
- 1.5 Social Institutions

#### **2. Culture and Related Concepts**

- 2.1 Definition of Culture
- 2.2 Types of Culture
- 2.3 Elements of Culture
- 2.4 Role of Culture in Organization
- 2.5 Socialization and Personality

#### **3. Interpersonal Relations**

- 3.1 Interpersonal Behaviour
- 3.2 Formation of Personal Attitudes
- 3.3 Language and Communication
- 3.4 Motivations and Emotions
- 3.5 Public Opinion

#### **4. Social Stratification**

- 4.1 Factors of Social Stratification
- 4.2 Caste and class
- 4.3 Power, Prestige, and Authority
- 4.4 Social Mobility
- 4.5 Migration

#### **5. Human Ecology**

- 5.1 Ecological Processes
- 5.2 Ecosystem and energy
- 5.3 Ecosystem and Physical Environment
- 5.4 Solid Waste Disposal

## 5.5 Pollution

## 6. Population Dynamics

- 6.1 World Population Growth and Distribution
- 6.2 Population Dynamics in Pakistan
- 6.3 Causes and Consequences of Urbanization
- 6.4 Population Policy in Pakistan
- 6.5 Population and Development

## 7. Community Development

- 7.1 Meaning, Scope, and Subject Matter of Community Development
- 7.2 Processes of Community Development
- 7.3 Community Development Programs in Pakistan
- 7.4 Community Organization and Related Services
- 7.5 Cooperation and Conflict in Community Development

## 8. Deviance and Crime

- 8.1 Crime as a Social and Cultural Phenomenon
- 8.2 Crime and Social Organization
- 8.3 Organized Crime
- 8.4 Culture Based Crime
- 8.5 Economics of Crime

## 9. Sociology of Change and Development

- 9.1 What is Social Change and Development?
- 9.2 Dynamics of Social Change
- 9.3 Role of NGOs in Development
- 9.4 World System and Development
- 9.5 Gender and Development

## Recommended Readings

1. Allport, G. W. (1985). *The Historical Background of Modern Social Psychology*. New York, Random House.
2. Bernard, A. and T. Burgess (2004). *Sociology*, Cambridge University Press.
3. DuBrin, A. J. (2007). *Human Relations: Interpersonal Job Oriented Skills*. New York, Prentice Hall.
4. Gardezi, H. N., Ed. (1991). *Understanding Pakistan: The Colonial Factor in Societal Development*. Lahore, Maktaba Fikr-o-Danish.
5. Hafeez, S. (1991). *Changing Pakistan Society*. Karachi, Royal Book Company. Gardezi, H. N., Ed. (1991).
6. Jones, G. W. (2005). "Why are Population and Development Issues not Given Priority?" *Asia-Pasific Population Journal* **20**(1).
7. Macionis, J. J. (1999). *Sociology 7<sup>th</sup> Edition*, National Book Foundation, Islamabad

8. Maser, C. (1997). Sustainable Community Development: Principles and Concepts. Florida St. Lucie Press.
9. Nelson, N. and S. Wright (1995). Power and Participatory Development: Theory and Practice. London, Intermediate Technology Publications.
10. Syed, S. H. (2003). The State of Migration and Multiculturalism in Pakistan: The Need for Policy and Strategy. Islamabad, UNESCO: 1-30.
11. Utton, A. E. (1976). Human Ecology, West View Press.
12. Webster, A. (1990). Introduction to Sociology of Development. London, Nacmillan Education Ltd.
13. Weiss, A. M. (2001). Power and civil society in Pakistan, Oxford University press.

## **SOCIAL ANTHROPOLOGY**

### **(For Engineers)**

Objectives: The students are expected to learn anthropological skills for application by professional engineers and other related practitioners. Societal growth needs are to be understood within our own cultural environment. Such a body of applied knowledge will result in improving the professional performance of would-be engineers. As culture and society play an important role towards all human activities, this course will help students relate technical skills to the societal needs and requirements.

#### **I Introduction**

1. Anthropology and Social Anthropology
2. Fields of Anthropology
3. Anthropological Research Methods
4. Social Anthropology and other Social Sciences
5. Significance of Social Anthropology

#### **II Culture**

1. Definition, Properties and Taxonomy
2. Evolution of Growth and Culture
3. Evolution of Man: Religious and Modern Perspectives
4. Evolution of Culture
5. Culture and Personality

#### **III Evolution and Growth of Culture**

1. Evolution of Man
2. Schools of Thought in Cultural Anthropology
3. Acculturation
4. Enculturation
5. Ethnocentrism and Xenocentrism

#### **IV Language and Culture**

1. Communication
2. Structural Linguistics
3. Historical Linguistics
4. Relationship between Language and Culture
5. Ethnography

#### **V Economic System**

1. Global Economic System
2. The Allocation of Resources
3. The Conversion of Resources
4. The Distribution of Goods and Services
5. Poverty and Inequality

#### **VII Marriage and Family**

1. Marriage and Mate Selection
2. The Family: Types and Functions
3. Kinship System
4. Structure and Function of Family
5. Gender Relations

#### **VIII Political Organization**

1. Political Sociology
2. Origin of Political Organization and Organizational System
3. Types of Political Organizations
4. Power Politics and Factionalism in Pakistan
5. Resolution of Conflict

#### **IX Religion and Magic**

1. The Universality of Religion
2. Comparative Religions
3. Religion and Society
4. Religious Beliefs and Practices
5. Witchcraft and Sorcery

#### **XI Culture Change**

1. Forms of Art
2. Expressive Culture
3. Process of Cultural Change
4. Cultural Change in the Modern World
5. Cultural Change in Pakistani society

#### **Recommended Books**

1. *Ahmad, Akbar S. 1990. Pakistani Society, Karachi, Royal Books Co.*
2. *Bernard, H. Russel. 1994. Research Methods in Anthropology, Qualitative and Quantitative Approaches. London: Sage Publications*
3. *Bodley, John H. 1994. Cultural Anthropology, California: Mayfield Publishing Co.*

4. Brogger, Jan. 1993. *Social Anthropology and the Lonely Crowd*. New Delhi: Reliance Publishing
5. Ember, Carol R. & Ember Melvin. 2005. *Anthropology*, 11<sup>th</sup> ed. Englewood Cliffs: Prentice Hall, Ince. Harper and Row
6. Harris Marvin. 1987. *Cultural Anthropology*. New York: Harper and Row
7. Harris Marvin. 1985. *Culture, People, nature; An Introduction to General Anthropology* London: Harper and Row
8. Haviland, W. A. (2005). *Anthropology: The Human Challenge*. New York, Thomson Learning Inc.
9. Hertzler J. O. 1981. *The Social Structure of Islam*. Cambridge: Cambridge University Press.
10. Keesing, Roger m. 1998. *Cultural Anthropology: A contemporary perspective*. 3<sup>rd</sup> ed. New York: Harcourt Brace College Publishers.
11. Kottak, Conard Phillip. 2002. *Anthropology: The Exploration of Human Diversity*. 9<sup>th</sup> ed. Boston: McGraw Hill Higher Education.
12. Kennedy, Charles H. 1992. *Pakistan* London: Westview Press,.
13. Marron, Stanley. 1057. *Pakistani Society and Culture*. New Heaven
14. Wilson, Richard A. 1996. *Human Rights, Culture and Context: Anthropological Perspective*. London: Pluto Press.

### **Psychology courses for B.Sc/B.E in Engineering Programme**

Course-I **Understanding Psychology and Human Behaviour** 3 credit hrs

- What is Psychology?
- Nature, Scope and Application with Special Reference to Pakistan
- Different Schools of Psychology
- Methods of Psychology
- Learning
- Intelligence and Artificial Intelligence
- Personality and its Assessment
- Understanding Maladjustive Behaviour
- Positive Emotional States and Processes
- Stress Management and Anger Management

### **Books Recommended**

1. Atkinson R.C., & Smith E.E. (2000), *Introduction to Psychology* (13<sup>th</sup> ed.), Harcourt Brace College Publishers.
2. Fernald, L.D., & Fernald, P.S. (2005), *Introduction to Psychology*, USA: WMC Brown Publishers.
3. Hergenhahn, B.R. (2001). *An Introduction to the History of Psychology*, New York: Wadsworth.

4. Goodwin, C.J, (2000) Research in Psychology: Methods and Design, (3<sup>rd</sup> ed.), New York: John Wiley & Sons.
5. Synder, C.R., & Lopez, S.J. (2007) Positive Psychology, USA, Sage Publications.
6. Allen, B.P. (1997), Personality Theories: Development, Growth and Diversity, (2<sup>nd</sup> Ed.), Boston: Allyn & Bacon.
7. Cohen, R.J., & Swerdlik, M.E. (2005) Psychological Testing & Assessment (6<sup>th</sup> ed.), New York: McGraw-Hill.
8. Corcini, R., (2000). Current Psychotherapies. London: Thompson & Co Publishers.
9. Comer, R.J. (2004). Abnormal Psychology, USA: Freeman & Company.
10. Schwartz, B., Wasserman, E., & Robbins, S. (2002), Psychology of Learning and Behaviour, 5<sup>th</sup> Ed. Norton and Company.

Course II    **Professional Psychology**    3 credit hrs

- Introduction to Professional Psychology
- Psychological Testing
- Educational Psychology
- Industrial/Organizational Psychology
- Social Psychology
- Health Psychology
- Clinical Psychology
- Positive Psychology
- Legal, Ethical, and Professional Issues.

**Books Recommended**

1. Crow, L., & Crow, A. (2000) Educational Psychology, New Delhi: Euroasia Publishing House Ltd.
2. Spiegel, P.K., & Koocher, G.P. (1998), Ethics in Psychology, New York: Oxford University Press
3. Snyder, C.R., & Lopez, S.J. (2000), Handbook of Positive Psychology, New York: Oxford University Press.
4. Compton, W.C. (2005), Introduction to Positive Psychology, USA, Thomson Wadsworth.
5. Debra, L.N. & James Campbell Quick, (2000) Organizational Behaviour (3<sup>rd</sup> ed), Cincinnati: South Western.
6. Fred Luthans, Alexander, D.S. & Edwin, A. Locke (2000) (Eds), Handbook of Principles of Organizational Behaviour, London: Blackwell.
7. Brannon, L.& Reist, J. (2000), Health Psychology: An Introduction to Behaviour and Health (4<sup>th</sup> ed.), USA Wadsworth.



8. Donohue, W. & Ferguson, K. (Eds), (2003), Handbook of Professional Ethics for Psychologists; Issues, Questions and Controversies, London: Sage Publications.
9. Meyers, D. (2005), Social Psychology, 8<sup>th</sup> Ed. McGraw Hill Inc.
10. Cooper, J. & Hogg, M. (2003) Handbook of Social Psychology, Sage Publications
11. Halgin, R.P., Whitbourne, S.K., & Halgin, R. (2004), Abnormal Psychology: Clinical Perspectives on Psychological Disorders, New York: McGraw Hill.
12. Thorndike R.L., & Hage, E.P. (1995), Measurement and Evaluation in Psychology and Education (4<sup>th</sup> Ed), New York, MacMillan.

## **PROFESSIONAL ETHICS**

### **Course Description:**

Prerequisite: None

Corequisite: None

This course introduce contemporary and controversial ethical issues facing the business community. Topics include moral reasoning, moral dilemmas, law and morality, equity, justice and fairness, ethical standards, and moral development. Upon completion, students should be able to demonstrate an understanding of their moral responsibilities and obligations as members of the workforce and society.

### **Course Objectives:**

At the completion of the course requirements, the student will be able to:

- a. Define business ethics
- b. Describe the evolution of business ethics
- c. Describe major ethical perspectives
- d. Understand and apply n ethical decision-making framework
- e. Understand social responsibility from several dilemensions
- f. Understand how the organization influences ethical decision-making
- g. Examine how significant others influence ethical decision-making
- h. Develop an effective ethics programme.
- i. Understand international business ethics.

### **Course Outline:**

**An Overview of Business Ethics:** Business Ethics Defined, Social Responsibility, and Business Ethics, The Development of Business Ethics, Why study Business Ethics?, Framework for Studying Business Ethics.

**Ethical issues in Business:** Foundation of Ethical Conflict, Classifications of Ethical, Issues, Ethical Issues Related to Participants and Functional Areas of Business, Recognizing an Ethical Issue.

**Applying Moral Philosophies to Business Ethics:** Moral Philosophy Defined, Moral Philosophy Perspectives.

**Social Responsibility:** The Economic Dimension, The legal Dimension, The Ethical Dimension, the Philanthropic Dimension.

**An Ethical Decision-Making Framework:** Ethical Issue Intensity, Individual Factors: Stages of Cognitive Moral Development, Corporate Culture, Significant others, Opportunity, Business Ethics Evaluations and Intentions, Using the Ethical Decision-Making Framework to Improve Ethical Decisions.

**How the Organization Influences Ethical Decision Making:** Organizational Structure and Business Ethics, the role of Corporate Culture in Ethical Decision-Making, Group Dimensions of Organizational Structure and Culture, Implications of Organizational Relationships for Ethical Decisions.

**The Role of Opportunity and Conflict:** Opportunity, Conflict.

**Development of an Effective Ethics Programme:** An Effective Ethical Compliance, Programme, Codes of Ethics and Compliance Standards, High-Level Manager's Responsibility for Ethical Compliance Programme and the Delegation of Authority, Effective Communication of Ethical Standards, Establishing Systems to Monitor, Audit, and Enforce Ethical Standards, Continuous Improvement of the Ethical Compliance Programme, The Influence of Personal Values in Business Ethics Programmes, The Ethical Compliance Audit.

**International Business Ethics:** Ethical Perceptions and International Business, Culture As a Factor in Business, Adapting Ethical Systems to a Global Framework: Cultural Relativism, the Multinational Corporation, A universal Set of Ethics, Ethical Issues Around the Globe.

Text Books:

- Ferrell, O.C., and Fraedrich, John, Ethical Decision Making and Cases, New York: Houghton Mifflin.

## **ORGANIZATIONAL BEHAVIOUR**

**3 Credit Hrs**

- Introduction to Organizational Behaviour
  - Organizational Disciplines and topics
  - Psychological Perspective

- Social-Psychological Perspectives
- Structure and Control in Organization
  - Introduction
  - Bureaucracy
  - Managerial Work
  - Contingency theory
  - Organizational Design
- Individual and Work Learning
  - Learning Theories
  - Learning and Work
- Stress
  - Types of Stress and Work
  - Occupational Stress Management
- Individual Differences
  - Personality and its factors
  - Personality dimensions and social learning
  - Intelligence
- Motivation and Job Satisfaction
  - Needs at Work
  - Theories of Motivation and job satisfaction
  - Correlates of Job satisfaction
  - Correlates of Job satisfaction
- Group and Work
  - Social Interaction
  - Dramaturgy and impression Management
  - Social Skill
- Group and Inter group Behaviour
  - Group Structure & Norms
  - Group Processes
  - Hawthorne Studies
- Leadership
  - Leadership as an attribute
  - Leadership Style
- Patterns of Work
  - Work-the classical approach
  - Marx, Weber, & The critique of labor
  - Foucault & Disciplinary Power

- Conflict and Consent in Work
  - The labor Process debate
  - Work place control and resistance
  - Industrial conflict and industrial relations
  
- Organizational culture
  - Organizational culture and strategic management
  - Exploring organizational culture
  - Evaluating concept of culture

Books Recommended:

1. Fincham, R., & Rhodes, P. (2003), Principles of Organizational Behaviour, 3<sup>rd</sup> Oxford.
2. Noe, R., Hollenbeck, J. Gerhart, B., & Wright, P. (2006), Human Resource Management, 5<sup>th</sup> ed., McGraw Hill.
3. Newstrom John W. (2007), Organizational Behaviour, (12<sup>th</sup> Ed), McGraw Hill.
4. Luthan Fred, (2005), Organizational Behaviour, McGraw Hill Inc.
5. Robins, Stephen, (2005), Organizational Behaviour, McGraw Hill Inc.

- The Nature of Sociology
  - The study of social life
  - Exploring the global village
  - Sociology as a science
  - The Sociological imagination
  - The development of Sociology
  - Pioneers of Sociology
  - Nature, scope and subject matter of Sociology
  - Brief historical development of Sociology
  - Society and community
  - Relationship with other social sciences
  - Social Interaction Processes
  
- Social groups
  - Definition and functions
  - Types of social groups
  
- Social institutions
  - Definition
  - Structure and function of social institutions
  - Inter-relationships among various social institutions
  
- Culture and related concepts
  - Definition and aspects of culture
  - Elements of culture
  - Organization of culture
  - Other concepts, cultural relativism, sub cultures, ethnocentrism, culture lag
  
- Socialization and personality
  - Role and status
  - Socialization
  - Culture and personality
  
- Deviance and social control
  - Definition and types of deviance
  - Juvenile delinquency
  - Formal and information methods of social control
  
- Social stratification
  - Approach to study social stratification
  - Caste class and race as basics of social stratification
  
- Major perspectives in Sociology
  - Functionalist perspective

- Conflict perspective
- Interactionistic perspective
- Social Control and deviance
  - Agencies of social control
- Social stratification
  - Determinants of social stratification
  - Social mobility, types and definition
  - Dynamics of social mobility
- Concept of social movement
  - Theories of social movement
  - Social and cultural change
- Social and cultural change
  - Definition of social change
  - Dynamics of social change
  - Impact of globalization on society and culture
  - Resistance to change
- Collective behaviour
  - Definition
  - Characteristics
  - Causes
  - Types
  - Social movements
  - Mob and crowd behaviour

### **Books Recommended**

1. Neulreck, Kenneth, J. 2005, Sociology: Diversity, Conflict and Change, Boston
2. Barnard, Andy. 2004. Sociology, Cambridge University Press
3. Giddens, Anthony, 2004, Sociology 4<sup>th</sup> edition, Cambridge Polity Press
4. Albrow, Martin, 2003, Sociology, London Routledge.
5. Richard, T. Schaefer, 2003, Sociology 5<sup>th</sup> edition, McGraw Hill College
6. Kendall, Diana, 2004. Sociology in our Times, 4<sup>th</sup> ed, Wadsworth
7. Tyler Melissa, Wallace Claire & Abbott Pamela, 2005, An Introduction to Sociology, 3<sup>rd</sup> ed. Routledge.

### **CRITICAL THINKING**

**3 Credit Hrs**

- The Power of Critical Thinking
  - Claims and Reasons
  - Reasons and Arguments
  - Arguments in the Rough

- The Environment of Critical Thinking
  - Perils of Haunted Mind
  - Self and the Power of the Group
  - Subjective and Social Relativism
  - Skepticism
- Making Sense of Arguments
  - Arguments Basics
  - Patterns
  - Diagramming Arguments
  - Assessing Long Arguments
- Reasons for Belief and Doubt
  - Conflict Experts and Evidence
  - Personal Experience
  - Fooling Ourselves
  - Claims in the News
- Faulty Reasoning
  - Irrelevant Premises
  - Genetic Fallacy, Composition, Division
  - Appeal to the Person, Equivocation, Appeal to Popularity
  - Appeal to Tradition, Appeal to Ignorance, Appeal to Emotion
  - Red Herring, Straw Man
- Unacceptable Premises
  - Begging the Question, False Dilemma
  - Slippery Slope, Hasty Generalization
  - Faulty Analogy
- Deductive Reasoning: Propositional Logic
  - Connectives and Truth Values
  - Conjunction, Disjunction, Negation
  - Conditional, Checking for Validity
  - Simple Arguments, Tricky Arguments
  - Streamlined Evaluation
- Deductive Reasoning: Categorical Logic
  - Statements and Classes
  - Translations and Standard Form
  - Terms, Quantifiers
  - Diagramming Categorical Statements
  - Sizing up Categorical Syllogisms
- Inductive Reasons
  - Enumerative Induction
  - Sample Size, Representativeness, Opinion Polls

- Analogical Induction
- Casual Arguments, Testing for Causes
- Casual Confusions
- Inference to the Best Explanation
  - Explanations and Inference
  - Theories and Consistency
  - Theories and Criteria
  - Testability, Fruitfulness, Scope, Simplicity
  - Conservatism
- Judging Scientific Theories
  - Science and Not Science
  - The Scientific method, Testing Scientific Theories
  - Judging Scientific Theories
  - Copernicus versus Ptolemy, Evolution Versus Creationism
  - Science and Weird Theories
  - Making Weird Mistakes
  - Leaping to the Weirdest Theory, Mixing What Seems with What is
  - Misunderstanding the Possibilities
  - Judging Weird Theories
  - Crop Circles, Talking with the Dead

### **BOOKS RECOMMENDED**

1. Vaughn Lewis, 2005, The Power of Critical Thinking, Oxford University Press.
2. Paulsen David W., Cederblom Jerry:2000, Critical Reasoning, Wadsworth
3. Restall Greg. 2005, Logic: An Introduction, Routledge

### **INTRODUCTION TO PHILOSOPHY**

3 Credit Hrs

- Definition and Nature of Philosophy
- Theory of Knowledge
  - Opinion and Knowledge
  - Plato, the Republic Selection
  - Knowledge through Reason
  - Descartes Meditation on First Philosophy
  - Knowledge through Experience
  - Hume an Inquiry concerning Human Understanding (Selection)
  - Experience Structured by the Mind
  - Kant Critique of Pure Reason (Selection)
  - Knowing and Doing
  - James Pragmatism (Selection)
  - Knowledge and Emotion



- Jaggar Love and Knowledge (Selection)
- Philosophy of Religion
  - Proving that Existence of God
  - Anselm, Aquinas, Paley, Dawkins (Selection)
  - Justifying Religious Beliefs
  - Pascal Pensees (Selection)
  - James The will to Believe Selection
  - Freud the Future of An Illusion (Selection)
  - Confronting the Problems of Evil
  - Mackie Evil and Omnipotence (Complete)
  - Hick Philosophy of Religion (Selection)
- Metaphysics
  - Idealism and Materialism
  - Berkeley Three Dialogues Between Hylas and Pholonous (Selection)
  - Armstrong Naturalism, Materialism and First Philosophy (Selection)
  - The Mid-Body Problem
  - Descartes Meditations on First Philosophy (Selection)
  - O'Hear Introduction to the Philosophy of Science (Selection)
  - Dennett The Origins of Selves (Complete)
  - Pali Canon (Selection)
  - Penelhum Religion and Rationality (Selection)
- Freedom to Choose
  - Libertarianism
  - James The Dilemma of Determinism (Selection)
  - Taylor Metaphysics (Selection)
  - Determinism
  - Hospers Meaning and Free Will (Selection)
  - Skinner Walden Two (Selection)
  - Compatibilism
  - Stace Religion and the Modern Mind (Selection)
  - Radhakrishnan Indian Philosophy (Selection)
- Ethics
  - Fulfilling Human Nature
  - Aristotle Nicomachean Ethics (selection)
  - Loving God
  - Augustine The Morals of the Catholic Church and the City of God (Selection)
  - Following Natural Law
  - Aquinas Summa Theologiae (Selection)
  - Doing One's Duty
  - Kant Fundamental Principles of the Metaphysics of Morals (Selection)

- Maximizing Utility
- Mill Utilitarianism (Selection)
- Turning Values of Upside Down
- Nietzsche Human, All too Human and Beyond Good and Evil (Selection)
- Creating Ourselves
- Sartre Existentialism is a Humanism (Selection)
- Hearing the Feminine Voice
- Gilligan In a Different Voice (Selection)
- Baier What do Women Want in a Moral Theory (Selection)
- Political and Social Philosophy
  - The State as Natural
  - Plato the Republic (Selection)
  - Aristotle Politics (Selection)
  - The State as a Social Contract
  - Hobbes Philosophical Rudiments Concerning Government and Society (Selection)
  - Locke the Second Treatise of Government (Selection)
  - Liberty of the Individual
  - Mill On Liberty (Selection)
  - Alienation in Capitalism
  - Marx Economic and Philosophic Manuscripts of 1844 (Selection)
  - Justice and Social Trust
  - Rawls A Theory of Justice (Selection)
  - Nozick Anarchy, State, and Utopia (Selection)
  - Held Rights and Goods (Selection)
  - Women in Society
  - Wollstonecraft A Vindication of the Rights of Women (Selection)
  - De Behaviour The Second Sex (Selection)
  - The Value of Philosophy
  - Russel The Problems of Philosophy (Selection)
  - Midgley Philosophical Plumbing (Selection)

### **BOOKS RECOMMENDED**

1. Abel Donald C., Stumpf Samuel Enoch, 2002. Elements of Philosophy: An Introduction, 4<sup>th</sup> Ed. McGraw Hill.
2. Scruton Roger, 2001. A short History of Modern Philosophy, 2<sup>nd</sup> ed. Routledge.

# MANAGEMENT COURSES

## ENTREPRENEURSHIP

### Course Objective:

Entrepreneurship is an important component in the process of economic development. The purpose of this course is to analyse the theories of entrepreneurship and to go for case studies of successful entrepreneurs.

### Course Contents:

**Introduction:** The concept of entrepreneurship, The economist view of entrepreneurship, The sociologist view, Behavioural approach, Entrepreneurship and Management

**The Practice of Entrepreneurship:** The process of entrepreneurship, Entrepreneurial Management, The entrepreneurial business, Entrepreneurship in service institutions, The new venture

**Entrepreneurship and Innovation:** The innovation concepts, Importance of innovation for entrepreneurship, Sources of innovative opportunities, The innovation process, Risks involved in innovation

**Developing Entrepreneur:** Entrepreneurial profile, Trait approach to understanding entrepreneurship, Factors influencing entrepreneurship, The environment, Socio cultural factors, Support systems

**Entrepreneurship Organization:** Team work, Networking organization, Motivation and compensation, Value system

**Entrepreneurship and SMES:** Defining SMEs, Scope of SMEs, Entrepreneurial managers of SME, Financial and marketing problems of SMEs

**Entrepreneurial Marketing:** Framework for developing entrepreneurial marketing, Devising entrepreneurial marketing plan, Entrepreneurial marketing strategies, Product quality and design

**Entrepreneurship and Economic Development:** Role of entrepreneur in the economic development generation of services, Employment creation and training, Ideas, knowledge and skill development, The Japanese experience

### ***Case Studies of Successful Entrepreneurs***

## **Text Books:**

- Paul Burns and Jim Dew Hurst: Small Business and Entrepreneurship
- P.N. Singh: Entrepreneurship for Economic Growth
- Peter F. Drucker: Innovation and Entrepreneurship Peter F. Drucker
- John B. Miner: Entrepreneurial Success

## **PRINCIPLES OF MANAGEMENT**

### **Course Objectives:**

This is a rudimentary course for the students of business administration. The focus of attention will be given to learning fundamental principles of management and of managing people and organization in a historical as well as contemporary world. Students are expected to develop analytical and conceptual framework of how people are managed in small, medium and large public and private national and international organizations.

### **Course Contents:**

- Introduction, overview and scope of discipline
- The evolution and emergence of management thought
- Management functions
- Planning concepts, objectives, strategies and policies
- Decision making
- Organizing; departmentalization, line/staff authority, commitments and group decision making
- Staffing: principles of selection, performance, career planning
- Leading: Motivation, leadership, communication
- Controlling: the system and process and techniques of controlling
- Management and Society: future perspective

## **Text Books:**

- Stephen P. Robins, Mary Coulter: Management
- H. Koontz Odonnell and H. Weihrich: Management
- Mc Farland: Management: Foundation and Practice
- Robert M. Fulmer: The New Management.