Road Map BS (Computer Science) Session 2024-28

SR.NO.	CODE	COURSE_TITLE	DOMAIN	CRHRS
Semester 1				
1	CCC-301	Programming Fundamentals	CC/Major	4(3-1)
2	CGE-301	Application of Information and Communication Technologies	GER	3(2-1)
3	ENG-321	Functional English	GER	3(3-0)
4	MTH-323	Calculus and Analytic Geometry	GER/QR-I	3(3-0)
5	PHY-321	Applied Physics	GER	3(2-1)
6	ISL-321	Islamic Studies	GER	2(2-0)
	ISL-322	Ethics (for non-Muslims only)		
7	*THQ-I	Teaching of Holy Quran-I	GER	1(1-0)
8	**MTH-111	Basic Math-I (For Pre-Medical Students only)	DEF	3(3-0)
				18(15-3)
Semester 2				
1	CCC-302	Object Oriented Programming	CC/Major	4(3-1)
2	CCC-304	Database Systems	CC/Major	4(3-1)
3	CCC-306	Digital Logic Design	CC/Major	3(2-1)
4	ENG-322	Expository Writing	GER	3(3-0)
5	MTH-324	Multivariable Calculus	MSC/ID	3(3-0)
6	PST-321	Pakistan Studies	GER	2(2-0)
7	**MTH-112	Basic Math-II (For Pre-Medical Students only)	DEF	3(3-0)
				19(16-3)
Semester 3				
1	CCC-401	Data Structures	CC/Major	4(3-1)

2	CCC-407	Computer Networks	CC/Major	3(2-1)
3	CSI-403	Discrete Structures	GER/QR-II	3(3-0)
4	STA-328	Probability and Statistics	MSC/ID	3(3-0)
5	ICP-321	Ideology and Constitution of Pakistan	GER	2(2-0)
6	BAM-601	Entrepreneurship	GER	2(2-0)
7	*THQ-II	Teaching of Holy Quran-II	GER	1(1-0)
				17(15-2)
Semester 4				
1	CCC-402	Computer Organization and Assembly Language	CC/Major	3(2-1)
2	CCC-404	Information Security	CC/Major	3(2-1)
3	CCC-408	Software Engineering	CC/Major	3(3-0)
4	MTH-424	Linear Algebra	MSC/ID	3(3-0)
5	ENG-422	Technical and Business Writing	MSC/ID	3(3-0)
6	BAM-301	Introduction to Management	GER	2(2-0)
7	GER-604	Civics and Community Engagement	GER	2(2-0)
				19(17-2)
Semester 5				
1	CCC-501	Operating Systems	CC/Major	3(2-1)
2	CCC-507	Analysis of Algorithms	CC/Major	3(3-0)
3	CSI-417	Advance Database Management Systems	DC/Major	3(2-1)
4	CSI-503	Theory of Automata	DC/Major	3(3-0)
5	CSI-513	Mobile Application Development	DE/Major	3(2-1)
6	CSI-517	Advanced Programming	DE/Major	3(2-1)
7	*THQ-III	Teaching of Holy Quran-III	GER	1(1-0)
				18(14-4)

Semester 6				
1	CCC-502	Artificial Intelligence	CC/Major	3(2-1)
2	CSI-504	Parallel and Distributed Computing	DC/Major	3(2-1)
3	CSI-506	Computer Architecture	DC/Major	3(2-1)
4	CSI-508	Compiler Construction	DC/Major	3(2-1)
5	CSI-512	Web Engineering	DE/Major	3(2-1)
6	CSI-516	Software Testing	DE/Major	3(3-0)
				18(13-5)
Semester 7				
1	CSI-603	Introduction to Data Science	DE/Major	3(2-1)
2	CSI-607	Digital Image Processing	DE/Major	3(2-1)
3	CSI-609	Cloud Computing	DE/Major	3(2-1)
4	CSI-611	HCI and Computer Graphics	DC/Major	3(2-1)
5	CCC-631	Final Year Project - I	CC/Major	2(0-2)
6	CSI-633	Internship	URC	3(0-3)
7	*THQ-IV	Teaching of Holy Quran-IV	GER	1(1-0)
				17(08-9)
Semester 8				
1	CSI-606	Professional Practices	GER/AH	2(2-0)
2	CCC-632	Final Year Project - II	CC/Major	4(0-4)
3	ESC-614	Marketing and Social Media in Digital World	ESC	3(3-0)
				09(5-4)

* Non-Credit Course

** Deficiency Course

Grand Total= 135

Semester-1

Course Name: Programming Fundamentals	
Course Structure: Lectures: 3, Labs: 1	**Credit Hours:** 4
Prerequisites: None	
Objectives: The course is designed to familiarize students with the basic structured programming skills. It emphasizes upon problem analysis, algorithm designing, and program development and testing.	
Course Outline: Overview of computers and programming. Overview of language for e.g. C language C. Basics of structured and Modular programming. Basic Algorithms and problem solving, development of basic algorithms, analyzing problem, designing solution, testing designed solution. Fundamental programming constructs, translation of algorithms to programs, data types, control structures, functions, arrays, records, files, testing programs	
Reference Material: **1.** Problem Solving and Program Design in C / 6E Hanly & Koffman Addison-Wesley | Published: 02/06/2009 ISBN-10: 0321535421 | ISBN-13: 9780321535429 **2.** C How to Program, 5/E (Harvey & Paul) Deitel & Deitel, ISBN-10: 0132404168 ISBN-13: 9780132404167 Publisher: Prentice Hall Copyright: 2007	

APPLICATIONS OF INFORMATION AND COMMUNICATION TECHNOLOGIES

UGE Policy V 1.1 : General Education Course

Credits: 03 (Class Credits: 02; Lab Credits: 01)
Pre-Requisite: Nil
Offering: Undergraduate Degrees (including Associate Degrees)
Placement: 1 - 4 Semesters
Type: General Education
Fields: All

DESCRIPTION

This course is designed to provide students with an exploration of the practical applications of Information and Communication Technologies (ICT) and software tools in various domains. Students will gain hands-on experience with a range of software applications, learning how to leverage ICT to solve daily life problems, enhance productivity and innovate in different fields. Through individual and interactive exercises and discussions, students will develop proficiency in utilizing software for communication, creativity, and more.

COURSE LEARNING OUTCOMES

By the end of this course, students will be able to:

1. Explain the fundamental concepts, components, and scope of Information and Communication Technologies (ICT).
2. Identify uses of various ICT platforms and tools for different purposes.
3. Apply ICT platforms and tools for different purposes to address basic needs in different domains of daily, academic, and professional life.
4. Understand the ethical and legal considerations in use of ICT platforms and tools.

SYLLABUS

1. **Introduction to Information and Communication Technologies:**
   - Components of Information and Communication Technologies (basics of hardware, software, ICT platforms, networks, local and cloud data storage etc.).
   - Scope of Information and Communication Technologies (use of ICT in education, business, governance, healthcare, digital media and entertainment, etc.).
   - Emerging technologies and future trends.
2. **Basic ICT Productivity Tools:**
   - Effective use of popular search engines (e.g., Google, Bing, etc.) to explore World Wide Web.
   - Formal communication tools and etiquettes (Gmail, Microsoft Outlook, etc.).
   - Microsoft Office Suites (Word, Excel, PowerPoint).
   - Google Workspace (Google Docs, Sheets, Slides).
   - Dropbox (Cloud storage and file sharing), Google Drive (Cloud storage with Google Docs integration) and Microsoft OneDrive (Cloud storage with Microsoft Office integration).
   - Evernote (Note-taking and organization applications) and OneNote (Microsoft's digital notebook for capturing and organizing ideas).
   - Video conferencing (Google Meet, Microsoft Teams, Zoom, etc.).
   - Social media applications (LinkedIn, Facebook, Instagram, etc.).
3. **ICT in Education:**
   - Working with learning management systems (Moodle, Canvas, Google Classrooms, etc.).
   - Sources of online education courses (Coursera, edX, Udemy, Khan Academy, etc.).
   - Interactive multimedia and virtual classrooms.

4. **ICT in Health and Well-being:**
   - Health and fitness tracking devices and applications (Google Fit, Samsung Health, Apple Health, Xiaomi Mi Band, Runkeeper, etc.).
   - Telemedicine and online health consultations (OLADOC, Sehat Kahani, Marham, etc.).
5. **ICT in Personal Finance and Shopping:**
   - Online banking and financial management tools (JazzCash, Easypaisa, Zong PayMax, 1LINK and MNET, Keenu Wallet, etc.).
   - E-commerce platforms (Daraz.pk, Telemart, Shophive, etc.)
6. **Digital Citizenship and Online Etiquette:**
   - Digital identity and online reputation.
   - Netiquette and respectful online communication.
   - Cyberbullying and online harassment.
7. **Ethical Considerations in Use of ICT Platforms and Tools:**
   - Intellectual property and copyright issues.
   - Ensuring originality in content creation by avoiding plagiarism and unauthorized use of information sources.
   - Content accuracy and integrity (ensuring that the content shared through ICT platforms is free from misinformation, fake news, and manipulation).

PRACTICAL REQUIREMENTS

As part of the overall learning requirements, the course will include:

1. Guided tutorials and exercises to ensure that students are proficient in commonly used software applications such as word processing software (e.g., Microsoft Word), presentation software (e.g., Microsoft PowerPoint), spreadsheet software (e.g., Microsoft Excel) among such other tools. Students may be assigned practical tasks that require them to create documents, presentations, and spreadsheets etc.
2. Assigning of tasks that involve creating, managing, and organizing files and folders on both local and cloud storage systems. Students will practice file naming conventions, creating directories, and using cloud storage solutions (e.g., Google Drive, OneDrive).
3. The use of online learning management systems (LMS) where students can access course materials, submit assignments, participate in discussion forums, and take quizzes or tests. This will provide students with the practical experience with online platforms commonly used in education and the workplace.

SUGGESTED INSTRUCTIONAL / READING MATERIALS

1. "Discovering Computers" by Vermaat, Shaffer, and Freund.
2. "GO! with Microsoft Office" Series by Gaskin, Vargas, and McLellan.
3. "Exploring Microsoft Office" Series by Grauer and Poatsy.
4. "Computing Essentials" by Morley and Parker.
5. "Technology in Action" by Evans, Martin, and Poatsy.

Course Name: Calculus and Analytic Geometry	
Course Structure: Lectures: 3, Labs: 0	**Credit Hours:** 3
Prerequisites:	
Objectives:	

Course Outline:

Complex Numbers, DeMoivre's Theorem and its Applications, Simple Cartesian Curves, Functions and Graphs, Symmetrical Properties, Curve Tracing, Limit and Continuity, Differentiation of Functions. Derivative as Slope of Tangent to a Curve and as Rate of Change, Application to Tangent and Normal, Linearization, Maxima/Minima and Point of Inflexion, Taylor and Maclaurin Expansions and their convergence; Integral as Anti- derivative, Indefinite Integration of Simple Functions. Methods of Integration: Integration by Substitution, by Parts, and by Partial Fractions, Definite Integral as Limit of a Sum, Application to Area, Arc Length, Volume and Surface of Revolution.

Reference Material:

1. Calculus and Analytical Geometry, Swokowski Olinick. Pence. 1994. 6th edition.Brooks/Cole Publishers. 2. Calculus, 7th edition.2002.
2. John Wiley and Sons (WIE).
3. 3. Calculus, William, E. Boyce .Richard, C. Diprima. John Wiley & Sons, ISBN:0471093335.
4. Calculus and Analytical Geometry10thedition. Thomas, F. John Wiley and Sons.
5. Advanced Engineering Mathematics, 7th edition. Erwin, K. 1993. John Wiley & Sons Inc

FUNCTIONAL ENGLISH

UGE Policy V 1.1 : General Education Course

Credits: 03
Pre-Requisite: Nil
Offering: Undergraduate Degrees (including Associate Degrees)
Placement: 1 - 3 Semesters
Type: General Education
Fields: All

DESCRIPTION

This course is designed to equip students with essential language skills for effective communication in diverse real-world scenarios. It focuses on developing proficiency in English language usage: word choices, grammar and sentence structure. In addition, the course will enable students to grasp nuanced messages and tailor their communication effectively through application of comprehension and analytical skills in listening and reading. Moreover, the course encompasses a range of practical communication aspects including professional writing, public speaking, and everyday conversation, ensuring that students are equipped for both academic and professional spheres. An integral part of the course is fostering a deeper understanding of the impact of language on diverse audiences. Students will learn to communicate inclusively and display a strong commitment to cultural awareness in their language use. Additionally, the course will enable them to navigate the globalized world with ease and efficacy, making a positive impact in their functional interactions.

COURSE LEARNING OUTCOMES

By the end of this course, students will be able to:

1. Apply enhanced English communication skills through effective use of word choices, grammar and sentence structure.
2. Comprehend a variety of literary / non-literary written and spoken texts in English.
3. Effectively express information, ideas and opinions in written and spoken English.
4. Recognize inter-cultural variations in the use of English language and to effectively adapt their communication style and content based on diverse cultural and social contexts.

SYLLABUS

1. **Foundations of Functional English:**
   - Vocabulary building (contextual usage, synonyms, antonyms and idiomatic expressions)
   - Communicative grammar (subject-verb-agreement, verb tenses, fragments, run-ons, modifiers, articles, word classes, etc.)
   - Word formation (affixation, compounding, clipping, back formation, etc.)
   - Sentence structure (simple, compound, complex and compound-complex)
   - Sound production and pronunciation
2. **Comprehension and Analysis:**
   - Understanding purpose, audience and context
   - Contextual interpretation (tones, biases, stereotypes, assumptions, inferences, etc.)
   - Reading strategies (skimming, scanning, SQ4R, critical reading, etc.)
   - Active listening (overcoming listening barriers, focused listening, etc.)
3. **Effective Communication:**
   - Principles of communication (clarity, coherence, conciseness, courteousness, correctness, etc.)
   - Structuring documents (introduction, body, conclusion and formatting)

- Inclusivity in communication (gender-neutral language, stereotypes, cross-cultural communication, etc.)
- Public speaking (overcoming stage fright, voice modulation and body language)
- Presentation skills (organization content, visual aids and engaging the audience)
- Informal communication (small talk, networking and conversational skills)
- Professional writing (business e-mails, memos, reports, formal letters, etc.)

PRACTICAL REQUIREMENT

As part of the overall learning requirements, students will also be exposed to relevant simulations, role-plays and real-life scenarios and will be required to apply skills acquired throughout the course in the form of a final project.

SUGGESTED INSTRUCTIONAL / READING MATERIALS

1. "Understanding and Using English Grammar" by Betty Schrampfer Azar.
2. "English Grammar in Use" by Raymond Murphy.
3. "The Blue Book of Grammar and Punctuation" by Jane Straus.
4. "English for Specific Purposes: A Learning-Centered Approach" by Tom Hutchinson and Alan Waters.
5. "Cambridge English for Job-hunting" by Colm Downes.
6. "Practical English Usage" by Michael Swan.
7. "Reading Literature and Writing Argument" by Missy James and Alan P. Merickel.
8. "Improving Reading: Strategies, Resources, and Common Core Connections" by Jerry Johns and Susan Lenski.
9. "Comprehension: A Paradigm for Cognition" by Walter Kintsch.
10. "Communication Skills for Business Professionals" by J.P. Verma and Meenakshi Raman.

PHY-	Applied Physics	3(2-1)

For Computer Science Disciplines (BS Computer Science, BS Information Technology, BS Software Engineering, BS Data Science, BS Artificial Intelligence)

Objectives:

The course introduces students with the basic concept of Physics and electronics. Students are also taught Physics laws and other associate topics to prepare them for the advanced level courses in this area. The focus of the course on electric force and its applications and related problems, conservation of charge, charge quantization, Electric fields due to point charge and lines of force and many other useful topics

Course Outline:

Electric force and its applications and related problems, conservation of charge, charge quantization, Electric fields due to point charge and lines of force. Ring of charge, Disk of charge, A point charge in an electric field, Dipole in a n electric field, The flux of vector field, The flux of electric field, Gauss' Law, Application of Gauss' Law, Spherically symmetric charge distribution, A charge isolated conductor, Electric potential energy, Electric potentials, Calculating the potential from the field and related problem Potential due to point and continuous charge distribution, Potential due to dipole, equipotential surfaces, Calculating the field from the potential , Electric current, Current density, Resistance, Resistivity and conductivity, Ohm's law and its applications, The Hall effect, The magnetic force on a current, The Biot- Savart law, Line of B, Two parallel conductors, Amperes' s Law, Solenoid, Toroids, Faraday's experiments, Faraday's Law of Induction, Lenz's law, Motional emf, Induced electric field, Induced electric fields, The basic equation of electromagnetism, Induced Magnetic field, The displacement current, Reflection and Refraction of light waves, Total internal reflection, Two source interference, Double Slit interference, related problems, Interference from thin films, Diffraction and the wave theory, related problems, Single-Slit Diffraction, related problems, Polarization of electromagnetic waves, Polarizing sheets, related problems.

Practicals

1. To study the behavior of RLC series circuit and determination of its resonance frequency.
2. To study the behavior of RLC Parallel circuit and determination of its resonance frequency.
3. Calibration of a voltmeter by a potentiometer.
4. Calibration of an ammeter by a potentiometer.
5. To determine the high resistance by Neon flash lamp and a capacitor.

Reference Material:

1. Fundamentals of Physics (Extended), 10th edition, Resnick and Walker
2. Narciso Garcia, Arthur Damask, Steven Schwarz., "Physics for Computer Science Students", Springer Verlag, 1998
3. Young and Freedman, 2010 University Physics 12th edition.
4. Halliday, Resnick and Krane, 2002. Physics Vol. I & II, 5th Ed, John Wiley and Sons Inc. New York.

ISLAMIC STUDIES

UGE Policy V 1.1 : General Education Course

Credits: 02
Pre-Requisite: Nil
Offering: Undergraduate Degrees (including Associate Degrees)
Placement: 1 - 4 Semesters
Type: General Education
Fields: All

DESCRIPTION

This course is designed to provide students with a comprehensive overview of the fundamental aspects of Islam, its beliefs, practices, history and influence on society. It will further familiarize the students with a solid foundation in understanding Islam from an academic and cultural perspective. Through this course, students will have an enhanced understanding of Islam's multifaceted dimensions which will enable them to navigate complex discussions about Islam's historical and contemporary role, fostering empathy, respect, and informed dialogue.

COURSE LEARNING OUTCOMES

By the end of this course, students will be able to:

1. Demonstrate enhanced knowledge of Islamic foundational beliefs, practices, historical development, spiritual values and ethical principles.
2. Describe basic sources of Islamic law and their application in daily life.
3. Identify and discuss contemporary issues being faced by the Muslim world including social challenges, gender roles and interfaith interactions.

SYLLABUS

1. **Introduction to Islam:**
   - Definition of Islam and its core beliefs.
   - The Holy Quran (introduction, revelation and compilation).
   - Hadith and Sunnah (compilation, classification, and significance).
   - Key theological concepts and themes (Tawhid, Prophethood, Akhirah etc.).
2. **Sirah of the Holy Prophet (Peace Be Upon Him) as Uswa-i-Hasana:**
   - Life and legacy of the Holy Prophet PBUH.
   - Diverse roles of the Holy Prophet PBUH (as an individual, educator, peace maker, leader etc.).
3. **Islamic History and Civilization:**
   - World before Islam.
   - The Rashidun Caliphate and expansion of Islamic rule.
   - Contribution of Muslim scientists and philosophers in shaping world civilization.
4. **Islamic Jurisprudence (Fiqh):**
   - Fundamental sources of Islamic jurisprudence.
   - Pillars of Islam and their significance.
   - Major schools of Islamic jurisprudence.
   - Significance and principles of Ijtihad.
5. **Family and Society in Islam:**
   - Status and rights of women in Islamic teachings.
   - Marriage, family, and gender roles in Muslim society.
   - Family structure and values in Muslim society.
6. **Islam and the Modern World:**
   - Relevance of Islam in the modern world (globalization, challenges and prospects).

- Islamophobia, interfaith dialogue, and multiculturalism.
- Islamic viewpoint towards socio-cultural and technological changes.

SUGGESTED INSTRUCTIONAL / READING MATERIALS

1. "The Five Pillars of Islam: A Journey Through the Divine Acts of Worship" by Muhammad Mustafa Al-Azami.
2. "The Five Pillars of Islam: A Framework for Islamic Values and Character Building" by Musharraf Hussain.
3. "Towards Understanding Islam" by Abul A' la Mawdudi.
4. "Islami Nazria e Hayat" by Khurshid Ahmad.
5. "An Introduction to Islamic Theology" by John Renard.
6. "Islamic Civilization Foundations Belief & Principles" by Abul A' la Mawdudi.
7. "Women and Social Justice: An Islamic Paradigm" by Dr. Anis Ahmad.
8. "Islam: Its Meaning and Message" by Khurshid Ahmad.

Note: This course is compulsory for Muslim and optional for non-Muslim undergraduate students. Non-Muslim students can opt for any course of at least the same or more credits in subjects such as religious studies, ethics, theology, comparative religion, Christian ethics, etc.

Course Code	Course Title	Credit Hour
MTH-111/ MTH511	Basic Mathematics I	3(3-0)

Preliminaries: Real and complex numbers, Introduction to sets, set operations, functions, types of functions. Matrices: Introduction to matrices, types of matrices, inverse of matrices, determinants, system of linear equations, Cramer's rule. Quadratic equations: Solution of quadratic equations, nature of roots of quadratic equations, equations reducible to quadratic equations. Sequence and Series: Arithmetic, geometric and harmonic progressions. Permutation and combinations: Introduction to permutation and combinations, Binomial Theorem: Introduction to binomial theorem. Trigonometry: Fundamentals of trigonometry, trigonometric identities. Graphs: Graph of straight line, circle and trigonometric functions.

RECOMMENDED BOOKS

1. 1. Thomas, Calculus, 11th Edition. Addison Wesley publishing company, 2005.

2. H. Anton, I. Bevens, S. Davis, Calculus, 8th edition, Jhon Willey & Sons, Inc. 2005.

3.Hughes-Hallett, Gleason, McCallum, et al, Calculus Single and Multivariable, 3rd Edition. John Wiley & Sons, Inc. 2002.

4. Swokowski. E. W., 'Fundamentals of Algebra and Trigonometry', Latest Edition.

5. Kaufmann. J. E., 'College Algebra and Trigonometry', PWSKent Company, Boston, Latest Edition.

Semester-2

Course Name: Digital Logic and Design	
Course Structure: Lectures: 2, Labs: 1	**Credit Hours:** 3
Prerequisites: Discrete Structures, Introduction to Computing	
Objectives: This course introduces the concept of digital logic, gates and the digital circuits. Further, it focuses on the design and analysis combinational and sequential circuits. It also serves to familiarize the student with the logic design of basic computer hardware components.	
Course Outline: Overview of Binary Numbers, Boolean Algebra, switching algebra, and logic gates, Karnaugh Map and Quin-McCluskey methods, simplification of Boolean functions, Combinational Design; two level NAND/NOR implementation, Tabular Minimization, Combinational Logic Design: adders, subtracters, code converters, parity checkers, multilevel NAND/NOR/XOR circuits, MSI Components, design and use of encoders, decoders, multiplexers, BCD adders, and comparators, Latches and flip-flops, Synchronous sequential circuit design and analysis, Registers, synchronous and asynchronous counters, and memories, Control Logic Design, Wired logic and characteristics of logic gate families, ROMs, PLDs, and PLAs, State Reduction and good State Variable Assignments, Algorithmic State Machine (ASM) Charts, Asynchronous circuits, Memory systems, Functional organization, Multiprocessor and alternative architectures: Introduction to SIMD, MIMD, VLIW, EPIC; systolic architecture; interconnection networks; shared memory systems; cache coherence; memory models and memory consistency, Performance enhancements, Contemporary architectures	
Reference Material: 1. Digital Design, 2nd Ed., M. Morris Mano, Prentice Hall, 1991. 2. Practical Digital Logic Design and Testing, P K Lala, Prentice Hall, 1996	

Course Name: Database Systems	
Course Structure: Lectures: 3, Labs: 1	**Credit Hours:** 4
Prerequisites: Data Structures and Algorithms	
Objectives: The course aims to introduce basic database concepts, different data models, data storage and retrieval techniques and database design techniques. The course primarily focuses on relational data model and DBMS concepts.	
Course Outline: Basic database concepts; Entity Relationship modelling, Relational data model and algebra, Structured Query language; RDBMS; Database design, functional dependencies and normal forms; Transaction processing and optimization concepts; concurrency control and recovery techniques; Database security and authorization. Small Group Project implementing a database. Physical database design: Storage and file structure; indexed files; b-trees; files with dense index; files with variable length records; database efficiency and tuning.	
Reference Material: 1. Database Systems 8E, C.J.Date, Addison Wesley Pub. Co. (2004). 2. Database Systems: A Practical Approach to Design, Implementation and Management 5E, R.Connolly and P.Begg, Addison-Wesley Pub. Co (2009). 3. Fundamentals of Database Systems, 5/E, Elmasri and Navathe, Addison-Wesley, ISBN: 0-201-74153-9.	

Course Name: Object Oriented Programming	
Course Structure: Lectures: 3, Labs: 1	**Credit Hours:** 4
Prerequisites: Programming Fundamentals	
Objectives: The course aims to focus on object-oriented concepts, analysis and software development.	
Course Outline: Evolution of Object Oriented (OO) programming, OO concepts and principles, problem solving in OO paradigm, OO programme design process, classes, methods, objects and encapsulation; constructors and destructors, operator and function overloading, virtual functions, derived classes, inheritance and polymorphism. I/O and file processing, exception handling	
Reference Material: 1. C++ How to Program, 6/E **(Harvey & Paul) Deitel & Deitel** ISBN-10: 0136152503 ISBN-13: 9780136152507 Publisher: Prentice Hall 2. Java How to Program, 7/E **(Harvey & Paul) Deitel & Deitel** ISBN-10: 0132222205 ISBN-13: 9780132222204 Publisher: Prentice Hall	

Course Name: Multivariable Calculus	
Course Structure: Lectures: 3, Labs: 0	**Credit Hours:** 3
Prerequisites: Calculus and Analytical Geometry	
Objectives: The goals are to develop the skills to have ground knowledge of multivariate calculus and appreciation for their further computer science courses	
Course Outline: Functions of Several Variables and Partial Differentiation. Multiple Integrals, Line and Surface Integrals. Green's and Stoke's Theorem. Fourier Series: periodic functions, Functions of any period P-2L, Even & odd functions, Half Range expansions, Fourier Transform. Laplace Transform, Z-Transform.	
Reference Material: 1. James Stewart, Multivariable Calculus, 6th edition, 2007, Cengage Learning publishers. 2. Swokowski, Olinick and Pence, Calculus and Analytical Geometry, 6th edition, 1994, Thomson Learning EMEA, Ltd. 3. Bernard Kolman, William F. Trench, Elementary Multivariable Calculus, 1971, Academic Press. 4. Howard Anton, Albert Herr, Multivariable Calculus, 5th edition, 1995, John Wiley	

Course Name: Pakistan Studies	
Course Structure: Lectures: 2, Labs: 0	**Credit Hours:** 2
Prerequisites:	
Objectives: Develop vision of historical perspective, government, politics, contemporary Pakistan, ideological background of Pakistan. • Study the process of governance, national development, issues arising in the modern age and posing challenges to Pakistan.	
Course Outline: 1. Historical Perspective a. Ideological rationale with special reference to Sir Syed Ahmed Khan, Allama Muhammad Iqbal and Quaid-e-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	
Reference Material: 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 Bangladesh., Washington: American Enterprise, Institute of Public Policy Research, 1972. 6. Mehmood, Safdar. Pakistan Kayyun Toota, Lahore: Idara-e-Saqafat-e-Islamia, Club Road,	

Course Code	Course Title	Credit Hour
MTH-112/ MTH512	Basic Mathematics II	3(3-0)

Preliminaries: Real Numbers and the Real Line, Functions and their graphs: Polynomial Functions, Rational Functions, Trigonometric Functions, and Transcendental Functions. Slope of a Line, Equation of a Line, Solution of equations involving absolute values, Inequalities. Limits and Continuity: Limit of a Function, Left Hand and Right Hand Limits, Continuity, Continuous Functions. Derivatives and its Applications: Differentiation of Polynomial, Rational and Transcendental Functions, Extreme Values of Functions. Integration and Indefinite Integrals: Integration by Substitution, Integration by Parts, Change of Variables in Indefinite Integrals. Least-Squares Line.

RECOMMENDED BOOKS

1. Thomas, Calculus, 11th Edition. Addison Wesley publishing company, 2005.
2. H. Anton, I. Bevens, S. Davis, Calculus, 8th edition, Jhon Willey & Sons, Inc. 2005
3. Hughes-Hallett, Gleason, McCallum, et al, Calculus Single and Multivariable, 3rd Edition. John Wiley & Sons, Inc. 2002.
4. Frank A.Jr, Elliott Mendelson, Calculus, Schaum's Outline Series, 4th edition, 1999

EXPOSITORY WRITING

UGE Policy V 1.1 : General Education Course

Credits: 03
Pre-Requisite: Functional English
Offering: Undergraduate Degrees (including Associate Degrees)
Placement: 2 - 4 Semesters
Type: General Education
Fields: All

DESCRIPTION

Expository Writing is a sequential undergraduate course aimed at refining writing skills in various contexts. Building upon the foundation of the pre-requisite course, Functional English, this course will enhance students' abilities of producing clear, concise and coherent written texts in English. The course will also enable students to dissect intricate ideas, to amalgamate information and to express their views and opinions through well-organized essays. The students will further be able to refine their analytical skills to substantiate their viewpoints using credible sources while adhering to established ethical writing norms. Additionally, the course will highlight the significance of critical thinking enabling students to produce original and engaging written texts.

COURSE LEARNING OUTCOMES

By the end of this course, students will be able to:

1. Understand the essentials of the writing process integrating pre-writing, drafting, editing and proof reading to produce well-structured essays.
2. Demonstrate mastery of diverse expository types to address different purposes and audiences.
3. Uphold ethical practices to maintain originality in expository writing.

SYLLABUS

1. **Introduction to Expository Writing:**
   - Understanding expository writing (definition, types, purpose and applications)
   - Characteristics of effective expository writing (clarity, coherence and organization)
   - Introduction to paragraph writing
2. **The Writing Process:**
   - Pre-writing techniques (brainstorming, free-writing, mind-mapping, listing, questioning and outlining etc.)
   - Drafting (three stage process of drafting techniques)
   - Revising and editing (ensuring correct grammar, clarity, coherence, conciseness etc.)
   - Proof reading (fine-tuning of the draft)
   - Peer review and feedback (providing and receiving critique)
3. **Essay Organization and Structure:**
   - Introduction and hook (engaging readers and introducing the topic)
   - Thesis statement (crafting a clear and focused central idea)
   - Body Paragraphs (topic sentences, supporting evidence and transitional devices)
   - Conclusion (types of concluding paragraphs and leaving an impact)
   - Ensuring cohesion and coherence (creating seamless connections between paragraphs)
4. **Different Types of Expository Writing:**
   - Description

- Illustration
- Classification
- Cause and effect (exploring causal relationships and outcomes)
- Process analysis (explaining step-by-step procedures)
- Comparative analysis (analyzing similarities and differences)

5. **Writing for Specific Purposes and Audiences:**
   - Different types of purposes (to inform, to analyze, to persuade, to entertain etc.)
   - Writing for academic audiences (formality, objectivity, and academic conventions)
   - Writing for public audiences (engaging, informative and persuasive language)
   - Different tones and styles for specific purposes and audiences
6. **Ethical Considerations:**
   - Ensuring original writing (finding credible sources, evaluating information etc.)
   - Proper citation and referencing (APA, MLA, or other citation styles)
   - Integrating quotes and evidences (quoting, paraphrasing, and summarizing)
   - Avoiding plagiarism (ethical considerations and best practices)

PRACTICAL APPLICATIONS AND CAPSTONE PROJECT

As part of the overall learning requirements, students will be required to build a writing portfolio having a variety of expository texts and present the same at the end of the course showcasing proficiency in expository writing.

SUGGESTED INSTRUCTIONAL / READING MATERIALS

1. "The St. Martin's Guide to Writing" by Rise B. Axelrod and Charles R. Cooper.
2. "They Say / I Say: The Moves That Matter in Academic Writing" by Gerald Graff and Cathy Birkenstein.
3. "Writing Analytically" by David Rosenwasser and Jill Stephen.
4. "Style: Lessons in Clarity and Grace" by Joseph M. Williams and Joseph Bizup.
5. "The Elements of Style" by William Strunk Jr. and E.B. White.
6. "Good Reasons with Contemporary Arguments" by Lester Faigley and Jack Selzer.
7. "Writing to Learn: How to Write - and Think - Clearly About Any Subject at All" by William Zinsser.
8. "The Norton Field Guide to Writing" by Richard Bullock, Maureen Daly Goggin, and Francine Weinberg.
9. "The Art of Styling Sentences" by Ann Longknife and K.D. Sullivan.
10. "Writing Today" by Richard Johnson-Sheehan and Charles Paine.

Semester-3

Course Name: Data Structures	
Course Structure: Lectures: 3, Labs: 1	**Credit Hours:** 4
Prerequisites: Object Oriented Paradigms	
Objectives: The course is designed to teach students structures and schemes, which allow them to write programs to efficiently manipulate, store, and retrieve data. Students are exposed to the concepts of time and space complexity of computer programs	
Course Outline: Introduction to data structures; Arrays, Stacks, Queues, Priority Queues, Linked Lists, Trees, and Graphs. Recursion, sorting and searching algorithms, Hashing, Storage and retrieval properties and techniques for the various data structures. Algorithm Complexity, Polynomial and Intractable Algorithms, Classes of Efficient Algorithms, Divide and Conquer, Dynamic, Greedy	
Reference Material: 1. Data Abstraction and Problem Solving with C++, 2nd ed, Frank M. Carrano, Paul Helman, Robert Veroff, Addison-Wesley, 1998. 2. Data Structures and Algorithms (SAMS teach yourself), Lafore, Sams Publishing, 1999. 3. Fundamentals of Data Structures in C++, Horowitz, Sahni, and Mehta, Computer Science Press, 1995. 4. Data Structures in JAVA, Standish, Addison Wesley, 2000	

Course Name: Computer Networks	
Course Structure: Lectures: 2, Labs: 1	**Credit Hours:** 3
Prerequisites: None	
Objectives: To introduce students to the concept of computer communication. Analogue & digital transmission. Network Layers, Network models (OSI, TCP/IP) and Protocol Standards. Emphasis is given on the understanding of modern network concepts.	
Course Outline: Analogue and digital Transmission, Noise, Media, Encoding, Asynchronous and Synchronous transmission, Protocol design issues. Network system architectures (OSI, TCP/IP), Error Control, Flow Control, Data Link Protocols (HDLC, PPP). Local Area Networks and MAC Layer protocols (Ethernet, Token ring), Multiplexing, Switched and IP Networks, Inter-networking, Routing, Bridging, Transport layer protocols TCP/IP, UDP. Network security issues. Programming exercises, labs or projects involving implementation of protocols at different layers.	
Reference Material: 1. Introduction to Computer Networks /4, A. S. Tanenbaum, Prentice Hall 2003 2. Computer Networks and Internets, 5/E, 2008 Douglas E. Comer, Purdue University ISBN-10: 0136061273 ISBN-13: 9780136061274 Publisher: Prentice Hall 3. Data and Computer Communications By William Stallings Published by Macmillan Pub. Co., 8th Edition 2006	

Course Name: Discrete Structures

Course Structure: Lectures: 3, Labs: 0	**Credit Hours:** 3
Prerequisites:	
Objectives: Introduces the foundations of discrete mathematics as they apply to computer Science, focusing on providing a solid theoretical foundation for further work. Further, this course aims to develop understanding and appreciation of the finite nature inherent in most Computer Science problems and structures through study of combinatorial reasoning, abstract algebra, iterative procedures, predicate calculus, tree and graph structures. In this course more emphasis shall be given to statistical and probabilistic formulation with respect to computing aspects	
Course Outline: Introduction to logic and proofs: Direct proofs; proof by contradiction, Sets, Combinatorics, Sequences, Formal logic, Prepositional and predicate calculus, Methods of Proof, Mathematical Induction and Recursion, loop invariants, Relations and functions, Pigeonwhole principle, Trees and Graphs, Elementary number theory, Optimization and matching. Fundamental structures: Functions; relations (more specifically recursions); pigeonhole principle; cardinality and countability, probabilistic methods	
Reference Material: 1. Kenneth H. Rosen, Discrete Mathematics and Its Applications, 6TH edition, 2006, Mcgraw Hill Book Co. 2. Richard Johnsonbaugh, Discrete Mathematics, 7TH edition, 2008, Prentice Hall Publishers. 3. Kolman, Busby & Ross, Discrete Mathematical Structures, 4th edition, 2000, Prentice-Hall Publishers. 4. Ralph P. Grimaldi, Discrete and Combinatorial Mathematics: An Applied Introduction, Addison-Wesley Pub. Co., 1985	

Course Name: Probability and Statistics	
Course Structure: Lectures: 3, Labs: 0	**Credit Hours:** 3
Prerequisites: None	
Objectives: To introduce the concepts of data analysis, presentation, counting techniques, probability and decision making.	
Course Outline: Introduction to Statistics and Data Analysis, Statistical Inference, Samples, Populations, and the Role of Probability. Sampling Procedures. Discrete and Continuous Data. Statistical Modeling. Types of Statistical Studies. Probability: Sample Space, Events, Counting Sample Points, Probability of an Event, Additive Rules, Conditional Probability, Independence, and the Product Rule, Bayes' Rule. Random Variables and Probability Distributions. Mathematical Expectation: Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables, Chebyshev's Theorem. Discrete Probability Distributions. Continuous Probability Distributions. Fundamental Sampling Distributions and Data Descriptions: Random Sampling, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem. Sampling Distribution of S2, t-Distribution, FQuantile and Probability Plots. Single Sample & One- and Two-Sample Estimation Problems. Single Sample & One- and Two-Sample Tests of Hypotheses. The Use of PValues for Decision Making in Testing Hypotheses (Single Sample & One- and TwoSample Tests), Linear Regression and Correlation. Least Squares and the Fitted Model, Multiple Linear Regression and Certain, Nonlinear Regression Models, Linear Regression Model Using Matrices, Properties of the Least Squares Estimators.	

Reference Material:

1. Probability and Statistics for Engineers and Scientists by Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers and Keying E. Ye, Pearson; 9th Edition (January 6, 2011). ISBN-10: 0321629116
2. Probability and Statistics for Engineers and Scientists by Anthony J. Hayter, Duxbury Press; 3rd Edition (February 3, 2006), ISBN-10:0495107573
3. Schaum's Outline of Probability and Statistics, by John Schiller, R. Alu Srinivasan and Murray Spiegel, McGraw-Hill; 3rd Edition (2008). ISBN-10:0071544259

IDEOLOGY AND CONSTITUTION OF PAKISTAN

UGE Policy V 1.1 : General Education Course

Credits: 02
Pre-Requisite: Nil
Offering: Undergraduate Degrees (including Associate Degrees)
Placement: 1 - 4 Semesters
Type: General Education
Fields: All

DESCRIPTION

This course is designed to provide students with a fundamental exploration of the ideology and the constitution of Pakistan. The course focuses on the underlying principles, beliefs, and aspirations that have been instrumental in shaping the creation and development of Pakistan as a sovereign state. Moreover, the course will enable students to understand the core provisions of the Constitution of the Islamic Republic of Pakistan concerning the fundamental rights and responsibilities of Pakistani citizens to enable them function in a socially responsible manner.

COURSE LEARNING OUTCOMES

By the end of this course, students will be able to:

1. Demonstrate enhanced knowledge of the basis of the ideology of Pakistan with special reference to the contributions of the founding fathers of Pakistan.
2. Demonstrate fundamental knowledge about the Constitution of Pakistan 1973 and its evolution with special reference to state structure.
3. Explain about the guiding principles on rights and responsibilities of Pakistani citizens as enshrined in the Constitution of Pakistan 1973.

SYLLABUS

1. **Introduction to the Ideology of Pakistan:**
   - Definition and significance of ideology.
   - Historical context of the creation of Pakistan (with emphasis on socio-political, religious, and cultural dynamics of British India between 1857 till 1947).
   - Contributions of founding fathers of Pakistan in the freedom movement including but not limited to Allama Muhammad Iqbal, Muhammad Ali Jinnah., etc.
   - Contributions of women and students in the freedom movement for separate homeland for Muslims of British India.
2. **Two-Nation Theory:**
   - Evolution of the Two-Nation Theory (Urdu-Hindi controversy, Partition of Bengal, Simla Deputation 1906, Allama Iqbal's Presidential Address 1930, Congress Ministries 1937 Lahore Resolution 1940).
   - Role of communalism and religious differences.
3. **Introduction to the Constitution of Pakistan:**
   - Definition and importance of a constitution.
   - Ideological factors that shaped the Constitution(s) of Pakistan (Objectives Resolution 1949).
   - Overview of constitutional developments in Pakistan.
4. **Constitution and State Structure:**
   - Structure of Government (executive, legislature, and judiciary).
   - Distribution of powers between federal and provincial governments.
   - 18th Amendment and its impact on federalism.

5. **Fundamental Rights, Principles of Policy and Responsibilities:**
   - Overview of fundamental rights guaranteed to citizens by the Constitution of Pakistan 1973 (Articles 8-28).
   - Overview of Principles of Policy (Articles 29-40).
   - Responsibilities of the Pakistani citizens (Article 5).
6. **Constitutional Amendments:**
   - Procedures for amending the Constitution.
   - Notable constitutional amendments and their implications.

SUGGESTED INSTRUCTIONAL / READING MATERIALS

1. "The Idea of Pakistan" by Stephen P. Cohen.
2. "Ideology of Pakistan" by Javed Iqbal.
3. "The Struggle for Pakistan" by I.H. Qureshi.
4. "Pakistan the Formative Phase" by Khalid Bin Sayeed.
5. "Pakistan: Political Roots and Development" by Safdar Mahmood.
6. "Ideology of Pakistan" by Sharif-ul-Mujahid.
7. "The Struggle for Pakistan: A Muslim Homeland and Global Politics" by Ayesha Jalal.
8. "Jinnah, Pakistan and Islamic Identity: The Search for Saladin" by Akbar S. Ahmed.
9. "The Making of Pakistan: A Study in Nationalism" by K.K. Aziz.
10. "Pakistan: A New History" by Ian Talbot.
11. "Pakistan in the Twentieth Century: A Political History" by Lawrence Ziring.
12. "The Constitution of Pakistan 1973". Original.
13. "Constitutional and Political Development of Pakistan" by Hamid Khan.
14. "The Parliament of Pakistan" by Mahboob Hussain.
15. "Constitutional Development in Pakistan " by G.W. Choudhury.
16. "Constitution-Making in Pakistan: The Dynamics of Political Order" by G.W. Choudhury.

COURSE SPECIFICATIONS

Basic Information				
Course Title**:**	ENTREPRENEURSHIP			
Course Code**:**	BAM-601			
Course credits/week**:**	Theory: 02	Lab: Nil	Total: 02	
Pre-requisite(s)**:**				
Co-requisite(s)**:**				
Program(s) on which the course is given**:**				
Is the course major or minor element of the program**:**	Major:	Minor:		
Department offering the program**:**	Lyallpur Business School			
Department offering the course**:**	Management Division			
Academic year/level**:**	4			
Overall Aims of the Course				

Course Description:

Welcome to Entrepreneurship! The paper is an introductory course intended to provide students with knowledge of entrepreneurship and the vital role played by entrepreneurs in the global economy. To achieve this, this course focuses on the creation of new ventures, the skills necessary for success in an entrepreneurial venture, and factors associated with new venture success. Entrepreneurship is interdisciplinary so this paper provides students with the opportunity to draw together elements of other papers such as finance, economics, management, marketing, production and so forth, showing how these must fit together to create a whole organization, rather than viewing these as a series of unrelated components.

This paper also mixes theory with practice. Students will be challenged to apply principles, concepts and frameworks to real world situations, particularly on assignments including the business plan and on exams. This paper will help students determine if they want to start their own ventures or if they prefer to operate as corporate entrepreneurs working within an existing organization. Companies increasingly want and need employees who can identify problems and opportunities, exercise initiative and develop creative solutions, and build support while implementing their ideas. The concepts and skills emphasized in this paper should be useful whether starting a new business or innovating within an existing organization

Course Objectives:

After completing this course, the participants should be able to:

1. develop an idea for a new venture
2. research its potential and understand the risks associated
3. undertake marketing, positioning, and customer development
4. prepare an analysis of the financial requirements and build a financial strategy for the new venture, including incremental appreciation of the equity base;
5. identify and prepare legal documents, IP policy, contracts, etc. and
6. develop a comprehensive business plan for their venture;

Course Outcomes:

Upon the completion of this course students will achieve basic competence in:

- understanding the concepts of entrepreneurship, innovation, intrapreneurship and

  small business management
- be familiar with a variety of behavioral and personality issues in new venturecreation.
- thinking and design thinking to develop new venture ideas
- how to use the business model canvas to operationalize new venture ideas how toevaluate growth opportunities
- how to write a business plan

Assignment requirements: This course will involve the following work and assignments:

Team Project: Group preparation and presentation of the selected project using available current technology.

Reading and writing assignments for each session:

Class Format & Weekly Work Plan:

Active involvement of students is needed in class discussions to understand this course. Our weekly class Instructions and discussions will follow this format:

1st - 2nd Week

Introduction to Entrepreneurship: What is entrepreneurship? Why become an entrepreneur? Types of entrepreneurs, approaches to entrepreneurship, Types of start- up firms, economic impact of entrepreneurial firms, Entrepreneurial firms' impact on society, Entrepreneurial firms' impact on larger firms, The entrepreneurial process (**Page 3-26**) (Entrepreneurship Successfully Launching New Venture by Bruce R Barringer and R Duane Ireland, 4th Edition)

Behavior and Personality Traits of Entrepreneurs: **Conduct an interview of a local businessman**

3rd-4th Week

The Environment, Economy and Entrepreneurship: External and Internal environment of entrepreneurship, Entrepreneurship during times of crisis (Hand

Diane Mulcahy. **Universities should be preparing students for the gig economy**. Harvard BusinessReview, October 03, 2019. HBSP Davidsson, P., Recker, J., & von Briel, F. (2021).

COVID-19 as **External Enabler of entrepreneurship practice and research**. *BRQ BusinessResearch Quarterly*, *24*(3), 214-223.

5th-6th Week

Recognizing Opportunities and Generating Ideas: Identifying and recognizing opportunities, finding gaps in the marketplace, techniques for generating ideas, encouraging and protecting new ideas, Innovation and the entrepreneur, The innovation process. (**Page 39-61**) (Entrepreneurship Successfully Launching New Venture by Bruce R Barringer and R Duane Ireland, 4th Edition)

Class Activity: Feng ZhuMarco Iansiti: **Why Some Platforms Thrive and Others Don't**. Harvard Business Review, January– February 2019 Issue. HBSP

7th- 8th Week

Feasibility Analysis & Writing a Business Plan: Defining feasibility, Product/Service Feasibility Analysis, Industry/Target Market Feasibility Analysis, Organizational Feasibility Analysis, Financial Feasibility Analysis (**Page 77-95**) (Entrepreneurship Successfully Launching

New Venture by Bruce R Barringer and R Duane Ireland, 4th Edition)
Reasons for Writing a Business Plan**,** Who Reads the Business Plan, Guidelines for Writing a Business Plan, Exploring Each Section of the Plan, Presenting the Business Plan. (**Page 111-125**) (Entrepreneurship Successfully Launching New Venture by Bruce R Barringer and R Duane Ireland, 4th Edition)

Mid Semester Examination

10th Week

Industry and Competitor Analysis: Studying Industry Trends, The Five Forces Model, Industry Types and the Opportunities They Offer, Identifying Competitors, Sources of Competitive Intelligence, Completing a Competitive Analysis Grid (**Page 147-167**) (Entrepreneurship Successfully Launching New Venture by Bruce R Barringer and R Duane Ireland, 4th Edition)

11th Week

Social Entrepreneurship: Social entrepreneurship, Ecopreneurs (**Page 144-150**)
Entrepreneurship : theory, process, practice by by Donald F. Kuratko and Howard H. Frederick
Roger L. Martin and Sally R. Osberg: How Social Entrepreneurs Make Change Happen. Harvard Business Review, October 14, 2015. HBSP.

12th Week

Legal Foundation and Regulatory Challenges: Initial ethical and legal issues facing a new firm, obtaining business licenses and permits, International protections for intellectual property, Patents, Copyrights, Trademarks, Domain names, Trade secrets (**Page 213-228 and page 393-418**) (Entrepreneurship Successfully Launching New Venture by Bruce R Barringer and R Duane Ireland, 4th Edition)

13th Week

Getting Financing or Funding: The importance of getting financing or funding, sources of equity funding, sources of debt financing, creative sources of financing and funding, (**Page 319-342**) (Entrepreneurship Successfully Launching New Venture by Bruce R Barringer and R Duane Ireland, 4th Edition)
Crowdsourcing and crowdfunding Guy Clapperton: **Why Successful Crowdfunding Requires a Social-Media Mind-Set**. Harvard Business Review, December 03, 2012. HBSP

14th Week

Franchising: What is franchising and how does it work? Establishing a franchise system, buying a franchise, legal aspects of the franchise relationship, more about franchising (**Page 495-520**) (Entrepreneurship Successfully Launching New Venture by Bruce R Barringer and R Duane Ireland, 4th Edition)

15th Week

Class Discussion on:

- Entrepreneurship in Pakistan as tool of Economic Development
- Importance of SMEs for the economic development of a country.

Final Project Submission & Presentations

Weekly Course Objectives

WEEK	TOPIC	COURSE CONTENTS

1 & 2	**Introduction to Entrepreneurship**	• Explain entrepreneurship and discuss its importance. • Describe corporate entrepreneurship and its use in established firms. • Discuss three main reasons people decide to become entrepreneurs. • Identify four main characteristics of successful entrepreneurs. • Explain the five common myths regarding entrepreneurship. • Explain how entrepreneurial firms differ from salary-substitute and lifestyle firms. • Discuss the changing demographics of entrepreneurs • Discuss the impact of entrepreneurial firms on economies and societies. • Identify ways in which large firms benefit from the presence of smaller entrepreneurial firms. • Explain the entrepreneurial process. • Behavior and Personality Traits of Entrepreneurs: **Conduct an interview of a local businessman** **Reading assignment**
3 &4	**The Environment, Economy and Entrepreneurship**	• Discuss external and internal environment of entrepreneurship, • Explain the entrepreneurship during times of crisis. • **Discuss the Gig economy and how Universities should be preparing students for the gig economy** • Discuss how covid-19 become the external enabler of entrepreneurship. Davidsson, P., Recker, J., & von Briel, F. (2021). COVID-19 as **External Enabler of entrepreneurship practice and research**. *BRQ Business Research Quarterly*, *24*(3), 214-223.
5 & 6	**Recognizing Opportunities and Generating Ideas**	• Explain why it's important to start a new firm when its "window of opportunity" is open. • Explain the difference between an opportunity and an idea. • Describe the three general approaches entrepreneurs use to identify opportunities. • Identify the four environmental trends that are most instrumental in creating business opportunities. • List the personal characteristics that make some people better at recognizing business opportunities than others. • Identify the five steps in the creative process. • Describe the purpose of brainstorming and its use as an idea generator. • Describe how to use library and Internet research to generate new business ideas. • Explain the purpose of maintaining an idea bank. • Describe three steps for protecting ideas from being lost or stolen.

		Class Activity: Feng ZhuMarco Iansiti: **Why Some Platforms Thrive and Others Don't**. Harvard Business Review, January–February 2019 Issue. HBSP **Quiz**
7 & 8	**Feasibility Analysis & Writing a Business Plan**	• Explain what a feasibility analysis is and why it's important. • Discuss the proper time to complete a feasibility analysis when developing an entrepreneurial venture. • Describe the purpose of a product/service feasibility analysis and the two primary issues that a proposed business should consider in this area. • Explain a concept statement and its contents. • Describe the purpose of industry/market feasibility analysis and the two primary issues to consider in this area. • Discuss the characteristics of an attractive industry. • Describe the purpose of organizational feasibility analysis and list the two primary issues to consider in this area. • Explain the importance of financial feasibility analysis and list the most critical issues to consider in this area. • Explain the purpose of a business plan. • Describe the two primary reasons for writing a business plan. • Describe who reads a business plan and what they're looking for. • Explain the difference between a summary business plan, a full business plan, and an operational business plan. • Explain why the executive summary may be the most important section of a business plan. • Explain why it's important to include separate sections on a firm's industry and its target market in a business plan. • Explain why the "Management Team and Company Structure" section of a business plan is particularly important. • Describe the purposes of a "sources and uses of funds" statement and an "assumptions sheet." **Assignment/Visit to BIC GCUF**
Mid-Term Examination		

10	**Industry and Competitor Analysis**	• Explain the purpose of an industry analysis. • Identify the five competitive forces that determine industry profitability. • Explain the role of "barriers to entry" in creating disincentives for firms to enter an industry. • Identify the nontraditional barriers to entry that are especially associated with entrepreneurial firms. • List the four industry-related questions to ask before pursuing the idea for a firm. • Identify the five primary industry types and the opportunities they offer. • Explain the purpose of a competitor analysis. • Identify the three groups of competitors a new firm will face. • Describe ways a firm can ethically obtain information about its competitors. • Describe the reasons for completing a competitive analysis grid. **Class Activity**
11	**Social Entrepreneurship**	• Explain Social entrepreneurship, • Describe Ecopreneurs • How Social Entrepreneurs Make Change Happen. **Quiz/ Visit to NIC Faisalabad**
12	**Legal Foundation and Regulatory Challenges**	• Describe how to create a strong ethical culture in an entrepreneurial venture. • Explain the importance of "leading by example" in terms of establishing a strong ethical culture in a firm. • Explain the importance of having a code of conduct and an ethics training program. • Explain the criteria important to selecting an attorney for a new firm. • Discuss the importance of a founders' agreement. • Provide several suggestions for how entrepreneurial firms can avoid litigation. • Provide an overview of the business licenses and business permits that a start-up must obtain before it starts conducting business. • Discuss the four major forms of intellectual property: patents, trademarks, • copyrights, and trade secrets • Describe the six-step process for obtaining a patent. • Identify the four types of trademarks. • Identify the types of material that are eligible for copyright protection. • Discuss the legal environment that facilitates trade secret protection. **Guest Lecture by an Entrepreneur**

13	**Getting Financing or Funding**	• Explain why most entrepreneurial ventures need to raise money during their early life. • Identify the three sources of personal financing available to entrepreneurs. • Provide examples of how entrepreneurs bootstrap to raise money or cut costs. • Identify the three steps involved in properly preparing to raise debt or equity financing. • Discuss the difference between equity funding and debt financing. • Explain the role of an elevator speech in attracting financing for an entrepreneurial venture. • Describe the difference between a business angel and a venture capitalist. • Explain why an initial public offering (IPO) is an important milestone in an entrepreneurial venture. • Describe the concept of ICO (Initial Coin Offerings) • Explain the advantages of leasing for an entrepreneurial venture. • **Why Successful Crowdfunding Requires a Social-Media Mind-Set**. Harvard Business Review, December 03, 2012. HBSP **Class Activity**
14	**Franchising**	• Explain franchising and how it differs from other forms of business ownership. • Describe the differences between a product and trademark franchise and a business format franchise. • Explain the differences among an individual franchise agreement, an area franchise agreement, and a master franchise agreement. • Describe the advantages of establishing a franchise system as a means of firm growth. • Identify the rules of thumb for determining when franchising is an appropriate form of growth for a particular business. • Discuss the factors to consider in determining if owning a franchise is a good fit for a particular person. • Identify the costs associated with buying a franchise. • Discuss the advantages and disadvantages of buying a franchise. • Identify the common mistakes franchise buyers make. • Describe the purpose of the Franchise Disclosure Document.
15& 16	Class Discussion	• Entrepreneurship in Pakistan as tool of Economic Development • Women entrepreneurship development in Pakistan • Importance of SMEs for the economic development of a country **Final Project Submission & Presentations**
	END TERM EXAMINATION	

Make-up Class, if needed / Revision Session	
Required Learning Source	
Text Book(s): (Title, Author, Edition, Publisher)	Bruce R Barringer and R Duane Ireland, Entrepreneurship Successfully Launching New Venture, 4th Edition. Pearson. Or Entrepreneurship – Theory Process Practice by Donald F. Kuratko and Howard H. Frederick, Asia Pacific Edition, Thomson. *Additional material provided by the class teacher*
Reference Book(s): (Title, Author, Edition, Publisher)	1. Robert D. Hisrich, Michael P. Peters, And Dean A. Shepherd, Entrepreneurship 10th edition 2. William Bygrave and Andrew Zacharakis, Entrepreneurship, second edition 3. Entrepreneurship and Innovation: Global Insights from 24 Leaders, Rothman Institute of Entrepreneurship
Journals/Periodicals: (Title, Publisher)	Davidsson, P., Recker, J., & von Briel, F. (2021). COVID-19 as **External Enabler of entrepreneurship practice and research**. *BRQ Business Research Quarterly*, *24*(3), 214-223. Feng ZhuMarco Iansiti: **Why Some Platforms Thrive and Others Don't**. Harvard Business Review, January– February 2019 Issue. HBSP Roger L. Martin and Sally R. Osberg: How Social Entrepreneurs Make Change Happen. Harvard Business Review, October 14, 2015. HBSP Guy Clapperton: **Why Successful Crowdfunding Requires a Social-Media Mind-Set**. Harvard Business Review, December 03, 2012. HBSP. Diane Mulcahy. **Universities should be preparing students for the gig economy**. Harvard Business Review, October 03, 2019. HBSP

Facilities Required for Teaching and Learning

- White Board
- Multimedia
- Zoom online (If online classes)

Pedagogies

- Oral Lecture
- Guest Lecture
- Group discussions
- Class Activities

No.	Week Assigned	Week Due	
1	3	6	Three surprise quiz tests will be conducted during the semester for better preparation of the students.
2	7	15	

Grading Criteria

The grading will be done as per the policy of the university

		methods, concepts, principles, laws and theories.	extend, operationalize, participate, predict, provide, show, solve, use, apply, demonstrate, sketch, practice, illustrate.
	4 **Analysis**	Ability to break down material into its component parts so that its organizational structure may be understood. Identification of parts, relationships between parts, recognition of organizational principles.	Break down, correlate, diagram, differentiate, discriminate, distinguish, focus, infer, outline, point out, recognize, separate, subdivide, compare, contrast, inspect, inventory, relate, examine.
	5 **Synthesis**	Ability to put parts together to form a new whole. Creative behaviors stressed in the formulation of something new.	Adapt, categorize, collaborate, combine, communicate, compile, compose, create, design, devise, facilitate, formulate, generate, incorporate, individualize, initiate, integrate, model, plan, propose, assemble, and organize.
	6 **Evaluation**	Ability to judge the value of material based on definite criteria.	Appraise, conclude, criticize, decide, defend, judge, justify, support, evaluate, rate, value, score, prioritize, select.

Contact Details

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Ms. Riffat Gill	Lecturer Lyallpur Business School, Faculty of Economics & Management Sciences, GC University, Faisalabad, Pakistan. **riffatgill@gcuf.edu.pk**
Course Specifications Developed By:	**Reviewed By:**
Dr. Muhammad Farooq Rehan	**Dr. Muhammad Waseem Bari**

Semester- 4

Course Name: Computer Organization and Assembly Language	
Course Structure: Lectures: 2, Labs: 1	**Credit Hours:** 3
Prerequisites: Digital Logic Design	
Objectives: The main objective of this course is to introduce the organization of computer systems and usage of assembly language for optimization and control. Emphasis should be given to expose the low-level logic employed for problem solving while using assembly language as a tool. At the end of the course the students should be capable of writing moderately complex assembly language subroutines and interfacing them to any high level language.	
Course Outline: Microprocessor Bus Structure: Addressing, Data and Control, Memory Organization and Structure (Segmented and Linear Models), Introduction to Registers and Flags, Data Movement, Arithmetic and Logic, Programme Control, Subroutines, Stack and its operation, Peripheral Control Interrupts, Interfacing with high level languages, Real-time application. Objectives and Perspectives of Assembly Language, Addressing Modes, Introduction to the Assembler and Debugger, Manipulate and translate machine and assembly code, Describe actions inside the processing chip, Discuss operations performed by an instruction set, Write a fully documented program, Using an assembler of choice.	
Reference Material: 1. Stallings, "Computer Organization & Architecture", 7th ed, Prentice HALL, 2006. 2. Irvine, Assembly Language for Intel-based Computers, 5th ed, Prentice Hall, 2007. 3. Computer Organization and Design, The Hardware/Software Interface, 4th ed, by David A. Patterson and John L. Hennessy, 2008. Elsevier Publishers.	

Course Name: Software Engineering	
Course Structure: Lectures: 3, Labs: 0	**Credit Hours:** 3
Prerequisites: Object Oriented Paradigm/Programming	
Objectives: To study various software development models and phases of software development life cycle. The concepts of project management, change control, process management, software development and testing are introduced through hands-on Team Projects.	
Course Outline: Introduction to Computer-based System Engineering; Project Management; Software Specification; Requirements Engineering, System Modelling; Requirements Specifications; Software Prototyping; Software Design: Architectural Design, Object-Oriented Design, UML modelling, Function-Oriented Design, User Interface Design; Quality Assurance; Processes & Configuration Management; Introduction to advanced issues: Reusability, Patterns; Assignments and projects on various stages and deliverables of SDLC.	
Reference Material: 1. Software Engineering 8E by Sommerville Addison Wesley, 2006 2. Software Engineering: A Practitioner's Approach /7E, Roger Pressman, McGraw-Hill, 2009	

Course Name: Linear Algebra	
Course Structure: Lectures: 3, Labs: 0	**Credit Hours:** 3
Prerequisites: None	
Objectives: To provide fundamentals of solution for system of linear equations, operations on system of equations, matrix properties, solutions and study of their properties.	
Course Outline: Vectors, Vector Spaces, Matrices & Determinants, Cofactor and Inverse, Rank, Linear Independence, Solution of system of Linear systems, Positive Definite matrix, Linear Transformations, Operations on matrices, Inner products, orthgonality and least squares, Eigenvalue & Eigenvectors. Applications to Systems of Equations and to Geometry, Singular Value Decomposition.	
Reference Material: 1. Bernard Kolman, David Hill, Elementary Linear Algebra with Applications, 9th edition, Prentice Hall PTR, 2007. 2. Gilbert Strang, Strang, Brett Coonley, Andy Bulman-Fleming, Andrew Bulman-	

Fleming, Strang's Linear Algebra And Its Applications, 4th edition, Brooks/Cole, 2005
3. Howard Anton, Chris Rorres, Elementary Linear Algebra: Applications Version, 9th edition, Wiley, 2005.
4. David C. Lay, Linear Algebra and Its Applications, 2nd edition, Addison-Wesley, 2000.

Course Name: Technical and Business Writing

Course Structure: Lectures: 3, Labs: 0	**Credit Hours:** 3

Prerequisites: Communication and Presentation Skills

Objectives:

Course Outline:

Overview of technical reporting, use of library and information gathering, administering questionnaires, reviewing the gathered information; Technical exposition; topical arrangement, exemplification, definition, classification and division, casual analysis, effective exposition, technical narration, description and argumentation, persuasive strategy, Organizing information and generation solution: brainstorming, organizing material, construction of the formal outline, outlining conventions, electronic communication, generation solutions. Polishing style: paragraphs, listening sentence structure, clarity, length and order, pomposity, empty words, pompous vocabulary, document design: document structure, preamble, summaries, abstracts, table of contents, footnotes, glossaries, cross-referencing, plagiarism, citation and bibliography, glossaries, index, appendices, typesetting systems, creating the professional report; elements, mechanical elements and graphical elements. Reports: Proposals, progress reports, Leaflets, brochures, handbooks, magazines articles, research papers, feasibility reports, project reports, technical research reports, manuals and documentation, thesis. Electronic documents, Linear verses hierarchical structure documents.

Reference Material:

1.Technical Report Writing, by Pauley and Riordan, Houghton Mifflin Company, 8th Edition.
2. Effective Technical Communication by Ashraf Rizvi, Tata McGraw-Hill.

Course Name: Introduction to Management	
Course Structure: Lectures: 2 / Labs: 0	**Credit Hours:** 2

Overall Aims of the Course

Course Description:

This is an introductory course about the management of organizations. It provides instructions on principles of management that have general applicability to all types of enterprises; basic management philosophy and decision making; principles involved in planning, organizing, leading, and controlling; and recent concepts in management. The principles learned in this course will allow the student to effectively work with and through others in an organization. The course will also encourage the students to explore and inquire the applicability of western management principles and theories in local settings. Besides, the course will discuss the Islamic perspective of managing businesses and organizations.

This course will cover the basic managerial functions of planning, organizing, leading, and controlling, We will also try to learn the evolution of management and best practices which are being used in today's modern era.

Course Objectives:

Theoretical Objectives: To understand the book and case studies mentioned in the book Management by Stephen P. Robbins and Mary Coulter

Practical Objectives: To understand and present practices of Management in any organization.

Learning Outcomes:

On completion of this course, the student should be able to:

1. Hold informed conversations with functional specialists and understand how to draw effectively on their expertise in managing organizations.
2. Understand the relevance of the western management principles and theories, for local settings.
3. Understand the Islamic perspective of managing businesses and organizations.
4. Apply course concepts and theory in a practical context.
5. Integrate several of the disciplines studied.
6. Demonstrate empirical investigative skills by producing an in-depth analysis of a management situation usually presented through case studies, resulting in recommendations for a programme of action.
7. Recognize the need to take a holistic approach to performance improvement rather than a narrowly functional approach.

Class Format & Weekly Work Plan:

Principles of Management is a theoretical course; thus, the majority of our classes will be focused on concepts and practical example discussion.

Our weekly class Instructions and discussions will follow this format:

1st – 2nd Week

Chapter – 1: Managers and You in the Workplace. Management History Module. What are management and a manager? Four functions of a manager? Ten roles of a manager by Henry Mintzberg. Layers of management. Skills required by managers. Importance of innovation, diversity, and customers for a manager. Early History of management. Early theories and approaches to management; the classical approach, behavioral approach, quantitative

5th Week – 6th Week

Chapter 8: Foundations of Planning. Define the nature and purposes of planning. Classify the types of goals organizations might have and the plans they use. Compare and contrast approaches to goal-setting and planning. Discuss contemporary issues in planning. **(Page 232-245)** *(Management by Stephan P. Robbins & Mary Coulter, 15th Edition).*

Seminar 1

7th Week – 8th Week

Chapter 9: Managing Strategy. Define strategic management and explain why it's important. Explain what managers do during the six steps of the strategic management process. Describe the three types of corporate strategies. Describe competitive advantage and the competitive strategies organizations use to get it. Discuss current strategic management issues. **(Page 252-265)** *(Management by Stephan P. Robbins & Mary Coulter, 15th Edition).*

Mid Semester Examination

10th Week – 11th Week

Chapter – 11: Designing Organizational Structure. Describe six key elements in organizational design. Contrast mechanistic and organic structures. Discuss the contingency factors that favor either the mechanistic model or the organic model of organizational design. Describe traditional organizational design options. Discuss organizing for flexibility in the twenty-first century. **(Page 306-324)** *(Management by Stephan P. Robbins & Mary Coulter, 15th Edition).*

12th Week – 13th Week

Chapter – 16: Motivating Employees. What is motivation? Early theories of motivation. Maslow's Hierachy of Needs theory, McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory. Contemporary theories of motivation. Goal-setting theory, Reinforcement theory, Designing motivating jobs, Equity theory, Expectancy theory, Integrating contemporary theories of motivation. Current issues in motivation. **(Page 448-468)** *(Management by Stephan P. Robbins & Mary Coulter, 15th Edition).*

Case study: Redefining norms in a conservative culture

14th Week – 15th Week

Chapter – 17: Being an Effective Leader. Define leader and leadership. Compare and contrast early theories of leadership. Describe the three major contingency theories of leadership. Describe contemporary views of leadership. Compare the various theories of leadership for their validity. Discuss twenty-first century issues affecting leadership. **(Page 480-500)** *(Management by Stephan P. Robbins & Mary Coulter, 15th Edition).*

Seminar 2

16th Week

Chapter – 18: Monitoring and Controlling. Explain the nature and importance of control. Describe the three steps in the control process. Explain how organizational and employee performance are measured. Describe tools used to measure organizational performance. Discuss contemporary issues in control. **(Page 516-535)** *(Management by Stephan P. Robbins & Mary Coulter, 15th Edition).*

Final Semester Examination

Weekly Course Objectives		
Week	**Module**	**Intended Learning Objectives**
1 - 2	**Managers and You in the Workplace.**	• To understand management History Module. What are management and a manager? • To explain four functions of a manager? • To explain ten roles of a manager by Henry Mintzberg. • To understand layers of management. Skills required by managers. • To understand importance of innovation, diversity, and customers for a manager. • To understand early History of management. • To understand early theories and approaches to management; the classical approach, behavioral approach, quantitative approach, contingency approach and contemporary approaches
3 - 4	**Making Decisions**	• To explain the manager's role as a decision maker. • To explain the 8-step process of decision making, Explain the four ways managers make decisions, Evidence based and intuitive decision making, • To classify decisions and decision-making conditions. • To describe how biases affect decision making and Know how to recognize when you're using decision-making errors and biases and what to do about it.
5 - 6	**Foundations of Planning**	• To define the nature and purposes of planning. • To define the nature and purposes of planning. • To identify the key contingency factors in planning. • To compare and contrast approaches to objective setting. • To discuss contemporary issues in planning.
7 - 8	**Managing Strategy**	• To define strategic management and explain why it's important. • To explain what managers do during the six steps of the strategic management process? • To describe the three types of corporate strategies. • To describe competitive advantage and the competitive strategies organizations use to get it. • To discuss current strategic management issues.
10 - 11	**Designing Organizational Structure**	• To describe six key elements in organizational design. • To contrast mechanistic and organic structures. • Discuss the contingency factors that favor either the mechanistic model or the organic model of organizational design. • To describe traditional organizational design options. • To discuss organizing for flexibility in the twenty-first century. • To develop your skill at acquiring and using power and Know how to stay connected and "in the loop" when working remotely
12 - 13	**Motivating Employees**	• To define motivation • To compare and contrast early theories of motivation. • To compare and contrast early theories of motivation. • To discuss current issues in motivation
14 - 15	**Being an Effective Leader**	• To discuss current issues in motivation • To compare and contrast early theories of leadership.

		• To describe the three major contingency theories of leadership. • To describe the three major contingency theories of leadership. • To describe the three major contingency theories of leadership. • To describe twenty-first century issues affecting leadership.
16	**Monitoring and Controlling**	• To explain the nature and importance of control. • To describe the three steps in the control process • To explain how organizational and employee performance are measured. • To describe tools used to measure organizational performance. • To discuss contemporary issues in control

Required Learning Resources	
Textbook **(Student must buy this book)** (Author, Title, Publisher, Edition)	• Stephen P. Robbins & Mary Coulter, Management, Pearson Publisher, 15th Edition.
Reference Book(s): (Author, Title, Publisher, Edition)	• Griffin, T.O., Management, Houghton Mifflin Company, Boston, USA, 8th Edition. • Daft, R. L. & Marcic, D., Understanding Management, Dallas: South–Western Cengage, 12th Edition. • Oliver Laasch, Principles of Management, Sage publisher, 2nd Edition.
Facilities Required for Teaching and Learning	
White Board / Multimedia (In case of Physical Classes) Zoom Online Meetings (In case of Online classes)	

CIVICS AND COMMUNITY ENGAGEMENT

UGE Policy V 1.1 : General Education Course

Credits: 02
Pre-Requisite: Nil
Offering: Undergraduate Degrees (including Associate Degrees)
Placement: 1 - 4 Semesters
Type: General Education
Fields: All

DESCRIPTION

This course is designed to provide students with fundamental knowledge about civics, citizenship, and community engagement. Students will learn about the essentials of civil society, government, civic responsibilities, inclusivity, and effective ways to participate in shaping the society which will help them apply theoretical knowledge to the real-world situations to make a positive impact on their communities.

COURSE LEARNING OUTCOMES

By the end of this course, students will be able to:

1. Demonstrate fundamental understanding of civics, government, citizenship and civil society.
2. Understand the concept of community and recognize the significance of community engagement for individuals and groups.
3. Recognize the importance of diversity and inclusivity for societal harmony and peaceful co-existence.

SYLLABUS

1. **Introduction to Civics and Citizenship:**
   - Definition of civics, citizenship, and civic engagement.
   - Historical evolution of civic participation.
   - Types of citizenship: active, participatory, digital, etc.
   - The relationship between democracy and citizenship.
1. **Civics and Citizenship**
   - Concepts of civics, citizenship, and civic engagement.
   - Foundations of modern society and citizenship.
   - Types of citizenship: active, participatory, digital, etc.
2. **State, Government and Civil Society**
   - Structure and functions of government in Pakistan.
   - The relationship between democracy and civil society.
   - Right to vote and importance of political participation and representation.
3. **Rights and Responsibilities**
   - Overview of fundamental rights and liberties of citizens under Constitution of Pakistan 1973.
   - Civic responsibilities and duties.
   - Ethical considerations in civic engagement (accountability, non-violence, peaceful dialogue, civility, etc.)
4. **Community Engagement**
   - Concept, nature and characteristics of community.
   - Community development and social cohesion.
   - Approaches to effective community engagement.
   - Case studies of successful community driven initiatives.
5. **Advocacy and Activism**
   - Public discourse and public opinion.

- Role of advocacy in addressing social issues.
- Social action movements.

6. **Digital Citizenship and Technology**
   - The use of digital platforms for civic engagement.
   - Cyber ethics and responsible use of social media.
   - Digital divides and disparities (access, usage, socioeconomic, geographic, etc.) and their impacts on citizenship.
7. **Diversity, Inclusion and Social Justice:**
   - Understanding diversity in society (ethnic, cultural, economic, political etc.).
   - Youth, women and minorities' engagement in social development.
   - Addressing social inequalities and injustices in Pakistan.
   - Promoting inclusive citizenship and equal rights for societal harmony and peaceful co-existence.

SUGGESTED PRACTICAL ACTIVITIES (OPTIONAL)

As part of the overall learning requirements, the course may have one or a combination of the following practical activities:

1. **Community Storytelling:** Students can collect and share stories from community members. This could be done through oral histories, interviews, or multimedia presentations that capture the lived experiences and perspectives of diverse individuals.
2. **Community Event Planning:** Students can organize a community event or workshop that addresses a specific issue or fosters community interaction. This could be a health fair, environmental cleanup, cultural festival, or educational workshop.
3. **Service-Learning:** Students can collaborate with a local nonprofit organization or community group. They can actively contribute by volunteering their time and skills to address a particular community need, such as tutoring, mentoring, or supporting vulnerable populations.
4. **Cultural Exchange Activities:** Students can organize a cultural exchange event that celebrates the diversity within the community. This could include food tastings, performances, and presentations that promote cross-cultural understanding.

SUGGESTED INSTRUCTIONAL / READING MATERIALS

1. "Civics Today: Citizenship, Economics, & You" by McGraw-Hill Education
2. "Citizenship in Diverse Societies" by Will Kymlicka and Wayne Norman.
3. "Engaging Youth in Civic Life" by James Youniss and Peter Levine.
4. "Digital Citizenship in Action: Empowering Students to Engage in Online Communities" by Kristen Mattson.
5. "Globalization and Citizenship: In the Pursuit of a Cosmopolitan Education" by Graham Pike and David Selby.
6. "Community Engagement: Principles, Strategies, and Practices" by Becky J. Feldpausch and Susan M. Omilian.
7. "Creating Social Change: A Blueprint for a Better World" by Matthew Clarke and Marie-Monique Steckel.

Semester- 5

Course Name: Operating Systems	
Course Structure: Lectures: 2, Labs: 1	**Credit Hours:** 3
Prerequisites: None	
Objectives: To help students gain a general understanding of the principles and concepts governing the functions of operating systems and acquaint students with the layered approach that makes design, implementation and operation of the complex OS possible.	
Course Outline: History and Goals, Evolution of multi-user systems, Process and CPU management, Multithreading, Kernel and User Modes, Protection, Problems of cooperative processes, Synchronization, Deadlocks, Memory management and virtual memory, Relocation, External Fragmentation, Paging and Demand Paging, Secondary storage, Security and Protection, File systems, I/O systems, Introduction to distributed operating systems. Scheduling and dispatch, Introduction to concurrency. Lab assignments involving different single and multithreaded OS algorithms.	
Reference Material: 1. Applied Operating Systems Concepts, 7th Edition, Silberschatz A., Peterson, J.L., & Galvin P.C. 2004. 2. Modern Operating Systems, 3rd Edition, Tanenmaum A.S., 2008.	

Course Name: Analysis of Algorithms	
Course Structure: Lectures: 3 / Labs: 0	**Credit Hours:** 3
Prerequisites: Discrete Structure, Data Structures and Algorithms	
Objectives: Detailed study of the basic notions of the design of algorithms and the underlying data structures. Several measures of complexity are introduced. Emphasis on the structure, complexity, and efficiency of algorithms.	
Course Outline: Introduction; Asymptotic notations; Recursion and recurrence relations; Divide-and-conquer approach; Sorting; Search trees; Heaps; Hashing; Greedy approach; Dynamic programming; Graph algorithms; Shortest paths; Network flow; Disjoint Sets; Polynomial and matrix calculations; String matching; NP complete problems; Approximation algorithms.	
Reference Material: 1. Introduction to Algorithms /2E, T. H. Cormen, C. E. Leiserson, and R. L. Rivest, MIT Press, McGraw-Hill, New York, NY, 2001. 2. Algorithms in C++; Robert Sedgewick	

Course Name: Mobile Application Development	
Course Structure: Lectures: 2 / Labs: 1	**Credit Hours:** 3
Prerequisites: Web Technologies	
Objectives:	
Course Outline: What is Android? Installing and Configuring the Android SDK Manager, Creating Android Application, Anatomy of an Android Application. Eclipse. Fragments, Calling Built-In Applications Using Intents, Displaying Notifications. Components of a Screen, Adapting to Display Orientation, Managing Changes to Screen Orientation, Utilizing the Action Bar, Creating the User Interface. Listening for UI Notifications. Views, User Preferences. Persisting Data. Sharing Data. Sending SMS Messages. Getting Feedback. Sending E-mail. Displaying Maps, Consuming Web Services Using HTTP, Accessing Web Services. Creating Services. Threading. Android games Development, Publishing Android Applications. Handling Telephone Calls, Fonts	
Reference Material: 1. Beginning Android 4 Application Development by Wei-Menge Lee, John Wiley & Sons, 2012 2. Beginning Android 4 by Grant Allen, Apress, (2011), ISBN: 1430239840.	

3. Beginning Android games by Mario Zechner, Apress, (2011), ISBN:1430230428
4. Pro Android 4 by Satya Komatineni and Dave MacLean, (2012), ISBN:1430239301 Apress
5. Professional Android 4 Application Development by Reto Meier, Wiley, (2012), ISBN:1118237226

Course Name: Advanced Programming	
Course Structure: Lectures: 2, Labs: 1	**Credit Hours:** 3
Prerequisites: Object Oriented Paradigms	
Course Outline: Visual Programming Basics; Introduction to Events; Fundamentals of Event-driven Programming, message handling, user interfaces, graphics device interface, painting and drawing, windows management, input devices, resources, string and menu resource, dialogs and windows controls, common controls, dynamic link libraries, threads and synchronization, network programming, Building Class Libraries at the Command Line, Class Libraries, Using References, Assemblies, Private Assembly Deployment, Shared Assembly Deployment, Configuration Overview, Configuration Files, Programmatic Access to Configuration, Using SDK Tools for Signing and Deployment, Metadata, Reflection, Late Binding, Directories, Files, Serialization, Attributes, Memory Management and Garbage Collection, Threading and Synchronization, Asynchronous Delegates, Application Domains, Marshal by Value, Marshal by Reference, Authentication and Authorization, Configuring Security, Code Access Security, Code Groups, Evidence, Permissions, Role-Based Security, Principals and Identities, Using Data Readers, Using Data Sets, Interacting with XML Data, Tracing Event Logs, Using the Boolean Switch and Trace Switch Classes, Print Debugging Information with the Debug Class, Instrumenting Release Builds with the Trace Class, Using Listeners, and Implementing Custom Listeners	
Reference Material: 1. Visual C#: How to Program, Deitel and Deitel, 6/e Edition, Prentice Hall / Pearson Education, 2017. 2. Programming in C# .NET, J.C. Bradley, A.C. Millspaugh, McGraw-Hill, 2014 3. Microsoft Visual C# 2013 Step by Step (Step by Step Developer), Sharp, J., 1st Edition (2013), Microsoft Press.	

Course Name: Theory of Automata	
Course Structure: Lectures: 3 Labs: 0	**Credit Hours:** 3
Prerequisites: Discrete Structures	
Objectives: The course aims to develop an appreciation of the theoretical foundations of computer science through study of mathematical & abstract models of computers and the theory of formal languages. Theory of formal languages and use of various abstract machines as 'recognizers' and parsing will be studied for identifying/validating the synthetic characteristics of programming languages. Some of the abstract machines shall also study as 'Transducers'.	
Course Outline: Finite State Models: Language definitions preliminaries, Regular expressions/Regular languages, Finite automata (FAs), Transition graphs (TGs), NFAs, Kleene's theorem, Transducers (automata with output), Pumping lemma and non regular language Grammars and PDA: Context free grammars, Derivations, derivation trees and ambiguity, Simplifying CFLs , Normal form grammars and parsing, Decidability, Chomsky's hierarchy of grammars Turing Machines Theory: Turing machines, Post machine, Variations on TM, TM encoding, Universal Turing Machine, Context sensitive Grammars, Defining Computers by TMs.	
Text Books/Reference Books: 1. An Introduction to Formal Languages and Automata, By Peter Linz, 4th edition, Jones	

& Bartlett Publishers, 2006
2. Theory of Automata, Formal Languages and Computation, By S. P. Eugene, Kavier, 2005, New Age Publishers, ISBN (10): 81-224-2334-5, ISBN (13) : 978-81-224-2334-1.
3. John Hopcroft and Jeffrey Ullman, Introduction to Automata Theory, Languages, and Computation, 2nd edition, 2001, Addison-Wesley.
4. Introduction to Languages and the Theory of Computation, By John C. Martin3rd edition, 2002, McGraw-Hill Professional.

Course Name: Advance Database Management Systems

Course Structure: Lectures: 2 Labs: 1	**Credit Hours:** 3

Prerequisites: Database Systems

Objectives:

Advanced Database Management Systems is an extension to "Database Systems" course. The aim of the course is to enhance the previous knowledge of database systems by deepening the understanding of the theoretical and practical aspects of the database technologies, and showing the need for distributed database technology to tackle deficiencies of the centralized database systems. Moreover, it focuses to introduce the basic principles and implementation techniques of distributed database systems, and expose emerging research issues in database systems and application development

Course Outline:

Introduction to advance data models such as object relational, object oriented. File organizations concepts, Transactional processing and Concurrency control techniques, Recovery techniques, Query processing and optimization, Database Programming (PL/SQL, T-SQL or similar technology), Integrity and security, Database Administration (Role management, managing database access, views), Physical database design and tuning, Distributed database systems, Emerging research trends in database systems, MONGO DB, NO SQL (or similar technologies)

Text Books/Reference Books:

1. Database Systems: A Practical Approach to Design, Implementation, and Management, 6th Edition by Thomas Connolly and Carolyn Begg
2. Database Management Systems, 3rd Edition by Raghu Ramakrishnan, Johannes Gehrke 3. Database System Concepts, 6th Edition by Avi Silberschatz, Henry F. Korth and S. Sudarshan.
4. Database Systems: The Complete Book, 2nd Edition by Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom

Semester- 6

Course Name: Artificial Intelligence	
Course Structure: Lectures: 2 / Labs: 1	**Credit Hours:** 3
Prerequisites: Data Structures	
Objectives: This course focuses on the set of computational tools and techniques, which mimic the human decision-making process and capability.	
Course Outline: Introduction to Common Lisp. AI classical systems: General Problem Solver, rules, simple search, means-ends analysis. ELIZA, pattern matching, rule based translators, OPS-5. Knowledge Representation: Natural language, rules, productions, predicate logic, semantic networks, frames, objects, scripts. Search: Depth first search, breadth first search, best first search, hill climbing, min-max search, A* search. Symbolic Mathematics: student, solving algebra problems, translating English equations, solving algebraic equations, simplification rules, re-write rules, meta-rules, Macsyma, PRESS, ATLAS. Logic Programming: Resolution, unification, horn-clause logic, Prolog, Prolog programming. Sample case studies of shells and Knowledge Based Systems. A brief appreciation of state of the art computational techniques like neural networks, genetic algorithm, fuzzy sets.	
Reference Material: 1. Artificial Intelligence by Luger, 4th edition Pearson Education. 2. Russell and Norvig, Artificial Intelligence: A Modern Aproach, 2nd ed, Pearson Education.	

Course Name: Parallel and Distributed Computing	
Course Structure: Lectures: 2 / Labs: 1	**Credit Hours:** 3
Prerequisites: Data Communications and Computer Networks	
Objectives:	
Course Outline: Why use parallel and distributed systems? Why not use them? Speedup and Amdahl's Law, Hardware architectures: multiprocessors (shared memory), networks of workstations (distributed memory), clusters (latest variation). Software architectures: threads and shared memory, processes and message passing, distributed shared memory (DSM), distributed shared data (DSD). Possible research and project topics, Parallel Algorithms, Concurrency and synchronization, Data and work partitioning, Common parallelization strategies, Granularity, Load balancing, Examples: parallel search, parallel sorting, etc. Shared-Memory Programming: Threads, Pthreads, Locks and semaphores, Distributed-Memory Programming: Message Passing, MPI, PVM. Other Parallel Programming Systems, Distributed shared memory, Aurora: Scoped behavior and abstract data types, Enterprise: Process templates. Research Topics	
Reference Material: 1. B. Wilkinson and M. Allen, Parallel Programming: Techniques and Applications Using Networked Workstations and Parallel Computers, 1/e, Prentice Hall, 1999. 2. W. Stevens, Advanced Programming in the Unix Environment, Addison Wesley, 1993	

Course Name: Computer Architecture	
Course Structure: Lectures: 2, Labs: 1	**Credit Hours:** 3
Prerequisites:	
Course Outline: The design of computer systems and components. Processor design, instruction set design, and addressing; control structures and microprogramming; memory management, caches, and memory hierarchies; and interrupts and I/O structures. Pipelining of processor Issues and Hurdles, exception handling, Parallelism, Multiprocessor Systems	
Reference Material: 1. Computer Architecture: A Quantitative Approach by Hennessy & Patterson, Morgan & Kauffman Series (2006) 4th Edition. 2. Computer Organization & Design: The Hardware/Software Interface By Patterson & Hennessy, Morgan & Kauffman Series (2008) 4th Edition	

Course Name: Compiler Construction	
Course Structure: Lectures: 2 / Labs: 1	**Credit Hours:** 3
Prerequisites: Theory of Automata and Formal Languages	
Objectives: At the end of the course students should understand the overall structure of a compiler, and will know significant details of a number of important techniques commonly used. They will be aware of the way in which language features raise challenges for compiler builders.	
Course Outline: Compiler techniques and methodology. Organization of compilers. Lexical and syntax analysis. Parsing techniques. Object code generation and optimization, detection and recovery from errors. Contrast between compilers and interpreters.	
Reference Material: 1. Compilers: Principles, Techniques, and Tools By Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman, Contributor Jeffrey D. Ullman ,Addison-Wesley Pub. Co., 2nd edition,1987 Original from the University of Michigan 2. Modern Compiler Design, By Dick Grune, Henri E. Bal, Ceriel J. H. Jacobs, Koen G. Langendoen, John Wiley, 2000. 3. Modern Compiler Implementation in C, By Andrew W. Appel, Maia Ginsburg, Contributor Maia Ginsburg, Cambridge University Press, 2004. 4. Modern Compiler Design by Dick Grune, Henri E. Bal, Ceriel J. H. Jacobs, Koen G. Langendoen, 2003, John Wiley & Sons.	

Course Name: Web Engineering	
Course Structure: Lectures: 2 / Labs: 1	**Credit Hours:** 3
Prerequisites: Fundamentals of Information Technology (required)	
Objectives: This course will extend the WWW Technologies and Web Based Applications architecture, development, deployment and management concepts studied in the course of Fundamentals of Information Technology. The instructor is expected to cover an in-depth treatment of the web technology and applications related topics including web standards, protocols, web applications architecture, web services, search engine architectures, content management, web2, and semantic web, to explore some of the technologies used for display, data access and processing, and to give the students practice in integrating these to produce a functional web-based system.	
Course Outline: In-depth study of World Wide Web architectures, protocols and standards (HTTP, HTML, xHTML, CGI, XML, WML, cHTML, etc.), Web Technologies and Tools (such as scripting tools) for web application development and deployment (web servers, application servers, etc.), Web Based Applications including search engines and content management, management of large scale web based information systems, Web Services, Web2, Semantic Web, and Web3, principles of web site design, practical exercise in web site development.	
Reference Material: **Suggested Text Books:**	

1. Nuckles, Craig, Web Applications: Concepts and Real World Design, Wiley 2006
2. Programming the World Wide Web (4th Edition) (Paperback), by Robert W. Sebesta (Author), Paperback: 752 pages, Publisher: Addison Wesley; 4th edition (August 17, 2007), ISBN-10: 0321489691

Reference Material:

1. Gosselin, Dan, et. al., The Web Warrior Guide to Web Design Technologies, Cengage Learning, 2003
2. Zak, Diane, et. al., The Web Warrior Guide to Web Programming, Cengage Learning, 2003
3. Leasure, T., Bob Leasure and James Leasure, The Web Warrior Guide to Web Database Technologies, Cengage Learning, 2003
4. Morrison, Mike and Joline Morrison, Database Driven Websites, 2/e, Cengage Learning, 2002
5. Web Wizard series for various technologies, Addison-Wesley
6. Jackson, J. C., Web Technologies: A Computer Science Perspective, Pearson (LPE), 2008
7. Web Application Architecture: Principles, Protocols and Practices by Leon Shklar and Richard Rosen (Paperback - Oct 31, 2008), Paperback: 420 pages, Publisher: Wiley; 2 edition (October 31, 2008), ISBN-10: 047051860X
8. Web Engineering: The Discipline of Systematic Development of Web Applications by Gerti Kappel, Birgit Prýýll, Siegfried Reich, and Werner Retschitzegger (Paperback - Jul 5, 2006)

Course Name: Software Engineering	
Course Structure: Lectures: 3, Labs: 0	**Credit Hours:** 3
Prerequisites: Object Oriented Paradigm/Programming	
Objectives: To study various software development models and phases of software development life cycle. The concepts of project management, change control, process management, software development and testing are introduced through hands-on Team Projects.	
Course Outline: Introduction to Computer-based System Engineering; Project Management; Software Specification; Requirements Engineering, System Modelling; Requirements Specifications; Software Prototyping; Software Design: Architectural Design, Object-Oriented Design, UML modelling, Function-Oriented Design, User Interface Design; Quality Assurance; Processes & Configuration Management; Introduction to advanced issues: Reusability, Patterns; Assignments and projects on various stages and deliverables of SDLC.	
Reference Material: 3. Software Engineering 8E by Sommerville Addison Wesley, 2006 4. Software Engineering: A Practitioner's Approach /7E, Roger Pressman, McGraw-Hill, 2009	

Semester- 7

Course Name: Introduction to Data Science	
Course Structure: Lectures: 2 / Labs: 1	**Credit Hours:** 3
Prerequisites: Artificial Intelligence	
Objectives: Data Science is the study of the generalizable extraction of knowledge from data. Being a data scientist requires an integrated skill set spanning mathematics, statistics, machine learning, databases and other branches of computer science along with a good understanding of the craft of problem formulation to engineer effective solutions. The aim of this course is to: Introduce students to this rapidly growing field and equip them with some of its basic principles and tools as well as its general mindset. Explain the significance of exploratory data analysis in data science. Identify common approaches used for Feature Generation as well as Feature Selection, and finally discuss the Ethical and Privacy issues. Programming language Python has been proposed for the practical work of this course	
Course Outline: Introduction: What is Data Science? Big Data and Data Science hype, Datafication, Current landscape of perspectives, Skill sets needed; Statistical Inference: Populations and samples, Statistical modeling, probability distributions, fitting a model, Intro to Python; Exploratory Data Analysis and the Data Science Process; Basic Machine Learning Algorithms: Linear Regression, k-Nearest Neighbors (k-NN), k-means, Naive Bayes; Feature Generation and Feature Selection; Dimensionality Reduction: Singular Value Decomposition, Principal Component Analysis; Mining Social-Network Graphs: Social networks as graphs, Clustering of graphs, Direct discovery of communities in graphs, Partitioning of graphs, Neighborhood properties in graphs; Data Visualization: Basic principles, ideas and tools for data visualization; Data Science and Ethical Issues: Discussions on privacy, security, ethics, Next-generation data scientists	
Reference Material: 1. Foundations of data science, Blum, A., Hopcroft, J., & Kannan, R., Vorabversion eines Lehrbuchs, 2016. 2. An Introduction to Data Science, Jeffrey S. Saltz, Jeffrey M. Stanton, SAGE Publications, 2017. 3. Python for everybody: Exploring data using Python 3, Severance, C.R., CreateSpace Independent Pub Platform. 2016. 4. Doing Data Science, Straight Talk from the Frontline, Cathy O'Neil and Rachel Schutt, O'Reilly. 2014. 5. Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data, EMC Education Services, John Wiley & Sons, 2015	

Course Name: Digital Image Processing	
Course Structure: Lectures: 2, Labs: 1	**Credit Hours:** 3
Prerequisites:	
Course Outline: The human visual system, electromagnetic system, working and components inside digital camera, pixels, image representation, sampling, quantization, mathematics of image formation, convolution, camera projection, point-based image processing, Fourier theory, image filtering in spatial and frequency domain, wavelets, image registration, morphological operations, color models, multispectral images, feature detection, image segmentation, Pattern recognition, etc	
Reference Material: 1. Gonzalez R. C., Woods R. E., Eddins S. L., Digital Image Processing Using Matlab, Pearson Education, 2nd edition, 2009. 2. Gonzalez R. C., Woods R. E., Digital Image Processing, Pearson Education, 3rd edition, 2008. 3. Understanding Digital Signal Processing by Richard G. Lyons, Prentice Hall; 3rd edition, 2010.	

Course Name: Cloud Computing	
Course Structure: Lectures: 2 / Labs: 1	**Credit Hours:** 3
Prerequisites: Distributed Computing	
Objectives:	
Course Outline: Datacenter Architectures, Cloud Stack , Technology Trends, Consistency, Availability, Partitions, Cluster File Systems, Data-flow Computation Frameworks, Key-Value Store and Interactive Query Systems, Big Data in the Clouds, Geographic distributed Storage, Programming Languages for the Cloud, DBases in the Cloud, In-Memory Frameworks, Google file system, Hadoop file system, MapReduce, OSes and Clouds Networking: topologies, Networking: Traffic Management, Networking: Transport Protocol Improvements, Security, Scheduling and Resource Management in clouds, Software Level Agreements	
Reference Material: 1. Handbook of Cloud Computing, Borko Furht. Springer (2010) or Latest Edition 2. Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security, and More, Kris Jamsa Jones & Bartlett Publishers, (2012) or Latest Edition 3. Cloud Computing and SOA: Convergence in your enterprise, David Linthicum (2009), Addison Wesley (Latest Edition) 4. Distributed File Systems: Hadoop, Lustre, Google File System, Andrew File System, Off system, Distributed File System", Ceph. General books LLC. (2010) or Latest Edition 5. Map Reduce Design Patterns, Donald Miner and Adam Shook. O' Reilly and Sons, (2012) or Latest Edition	

Course Name: HCI & Computer Graphics	
Course Structure: Lectures: 2 / Labs: 1	**Credit Hours:** 3
Prerequisites: Software Engineering	
Objectives:	
Course Outline: Contexts for HCI, Psychology of usable things, Processes for User-Centered Design, Metrics and Measures for Evaluation, Usability heuristics and principles of Usability testing, Physical capabilities, Cognitive and social models for interaction design, Principles of good interaction design, Accessibility, Principles of GUI, Visual design elements, Data gathering, Task analysis, Prototyping, Help and user documentation, Internationalization, Usability inspection methods, Usability testing methods, New Interaction Technologies, Usability in practice, Visual Design and Typography, Icon Design, Ubiquitous, Augmented and Virtual Reality	
Reference Material: 1. Designing the User Interface: Strategies for Effective Human-Computer Interaction, Ben Shneiderman and Catherine Plaisant, 6th Ed, Pearson Inc, 2016. 2. Designing Interactive Systems: A Comprehensive Guide to HCI, UX and Interaction Design, Benyon, D. 3rd Ed., Pearson. 2013 3. About Face: The Essentials of Interaction Design, Alan Cooper, Robert Reimann, David Cronin, Christopher Noessel, 4th Ed, Wiley, 2014	

Semester- 8

Course Name: Professional Practices	
Course Structure: Lectures: 2 / Labs: 0	**Credit Hours:** 2
Prerequisites: None	
Objectives: A Computing graduate as professional has some responsibilities with respect to the society. This course develops student understanding about historical, social, economic, ethical, and professional issues related to the discipline of Computing. It identifies key sources for information and opinion about professionalism and ethics. Students analyze, evaluate, and assess ethical and professional computing case studies. **Course Outline:** Introduction, Computing Ethics, Philosophy of Ethics, Ethics and the Internet. Intellectual Copy Right, Accountability and Auditing, Social Application of Ethics.	
Resources: 1. Deborah G. Johnson, "Computer Ethics", Pearson Education (2001) 3rd edition. 2. *Professional Issues in Software Engineering*, M.F. Bott et. al.	