Curricula/Syllabi
of
BS Information Technology
for
Punjab University Affiliated Colleges

Scheme Of Studies / Semester-Wise Workload

2nd Semester					
Sr.	Code	Course Title	Course Type	Prerequisite	Cr. Hrs.
1	CC-111	Discrete Structures	Computing Core		3
2	CC-112	Programming Fundamentals	Computing Core		3
3	CC-112L	Programming Fundamentals Lab	Computing Core		1
4	GE-164	Communication and Presentation Skills	General Education		3
5	UE-171	Introduction to Economics	University Elective		3
6	UE-172	Arabic Language	University Elective		2
7	HQ-002	Translation of Holy Quran	Quran and Sunnah	Translation of Holy Quran	1
8	MD-002	Math Deficiency - II	Deficiency Course		3*
Total Credit Hours: 16					

2. COMPUTING CORE COURSES

Course Title	**Discrete Structures**
Course Code	**CC-111**
Credit Hours	3
Category	Computing Core
Prerequisite	None
Co-Requisite	None
Follow-up	None
Course Description	**Mathematical Reasoning**: Propositional and predicate logic. **Propositional Logic:** Logical operators, translations between symbolic expressions and formal English expression, logical equivalences. **Predicate Logic:** Quantifiers, Nested quantification, equivalences, translations between symbolic forms and formal English. **Rules of Inference**: Proof methods and strategies**,** Direct proof, Proof by contraposition, proof by induction, proof by implication, Existence proof, Uniqueness proofs, trivial proofs, vacuous proofs. **Sets:** Notations, set operations, Venn diagrams, countable and uncountable sets, relations, equivalence relations and partitions, partial orderings, recurrence relations, functions, mappings. **Functions:** Injective, surjective, bijective, special types of functions, function composition, inverse functions, recursive functions, compositions, number theory, sequences, series, counting, inclusion and exclusion principle, pigeonhole principle, permutations and combinations. **Integers and Divisibility:** Division theorem, modular arithmetic, LCM, GCD, Euclidean and Extended Euclidean method, finding solutions to congruence. **Primes:** Fundamental theorem of arithmetic, characterizations of primes, Mersenne primes. **Induction:** Weak induction, strong induction. **Recursion and Recurrences:** Formulation of recurrences, closed formulas, **Counting:** product rule, sum rule, principle of inclusion-exclusion, combinations and permutations, binomial coefficients, Pascal's identity and Pascal's triangle**,** binomial theorem, pigeonhole principle. **Relations:** Reflexive, symmetric, transitive, antisymmetric, equivalence relations and equivalence classes, partial orders. **Graph Theory:** Terminologies, elements of graph theory, planar graphs, graph coloring, Euler graph, Hamiltonian path, rooted trees, traversals, handshaking lemma and corollary, special families of graphs, isomorphism, planarity, Eulerian and Hamiltonian graphs, trees.
Text Book(s)	1. Kenneth H. Rosen, Discrete Mathematics and Its Applications, 7th Edition, McGraw Higher-Ed, 2011, ISBN: 0073383090.
Reference Material	1. Susanna S. Epp, Discrete Mathematics with Applications, 4th Edition. 2. Richard Johnson Baugh, Discrete Mathematics, 7th Edition. 3. Kolman, Busby & Ross, Discrete Mathematical Structures, 4th Edition. 4. Ralph P. Grimaldi, Discrete and Combinatorial Mathematics: An Applied Introduction, 5th Edition. 5. Winifred Grassman, Logic and Discrete Mathematics: A Computer Science Perspective, 1st Edition.

Course Title	**Programming Fundamentals**
Course Code	**CC-112**
Credit Hours	3
Category	Computing core
Prerequisite	None
Co-Requisite	None
Follow-up	CC-211: Object Oriented Programming, DI-322: Web Technologies
Course Description	**Introduction**: Problem solving, Von-Neumann architecture, programming, compiler, linker, algorithms, Flowcharts/Pseudo Codes. **Basic C++ Language Constructs:** Data types, Variable and Constants, Operator and Expressions, Input and Output (I/O), Formatted I/O, arithmetic, comparison and logical operators. **Conditional Statements:** execution flow for conditional statements, if control structure, multiple selection using switch and logical operators. **Repetitive Statements**: execution flow for repetitive statements, Repetition using for and do while. **Procedural Programming in C Language:** functions, prototype, parameter and arguments, call by value and call by reference, stack rolling and unrolling, library and header files, scope and lifetime of variables (storage classes). **Lists:** memory organization of lists, multi-dimensional lists. **Composite data types arrays:** definition, processing, and passing of array to a function, multi-dimensional arrays. Searching and sorting. **Pointers:** pointer definition, pointer arithmetic, constant pointers, pointer and arrays. **Strings:** string and characters, string and string operations, static and dynamic memory allocation. **User Defined Data Types:** structures, definition, initialization, accessing members of structures, typedef, union, enumerations. **C File Processing:** files and streams, Sequential Access File, File I/O operations, Random Access File, Secondary Storage I/O. **Command Line Arguments.**
Text Book(s)	1. Tony Gaddis, Starting out with C++: from control structures through objects, 7th Ed., Addison-Wesley, 2012, ISBN 978-0-13-257625-3
Reference Material	1. D.S. Malik, C++ Programming, From Problem Analysis to Program Design, 5th Ed., Course Technology, 2011, ISBN: 978-0-538-79813-6
	2. Brian W. Kernighan, Dennis M. Ritchie, The C Programming Language, 2nd Ed., Prentice Hall, 1988, ISBN: 978-0131103627.
	3. Bjarne Stroustrup, The C++ Programming Language, 4th Edition, Addison-Wesley, 2013, ISBN 978-0321563842.
	4. References from different books, some web-links or lecture notes for reading will be provided.

Course Title	**Programming Fundamentals Lab**
Course Code	**CC-112L**
Credit Hours	1
Category	Computing core
Prerequisite	None
Co-Requisite	None
Follow-up	CC-211: Object Oriented Programming, DI-322: Web Technologies
Course Description	**Implementation**: the concepts studied in "CC-112 Programming Fundamentals", Flowcharts/Pseudo Codes. **Basic C++ Language Constructs:** Data types, Variable and Constants, Operator and Expressions, Input and Output (I/O), Formatted I/O, Escape Sequences **Decision Making:** using if/switch control structure. **Repetition**: using for and do while. **Functions**: prototype, parameter and arguments, call by value and call by reference. **Library and Header Files**. **Arrays**: Passing Arrays to function, multi-dimensional arrays, searching and sorting. **Pointers:** pointer definition, pointer arithmetic, constant pointers, pointer and arrays. **Dynamic Memory Allocation**. **User Defined Data Types:** structures, definition, initialization, accessing members of structures, typedef, unions. **C File Processing:** files and streams, Sequential Access File, Random Access File, Secondary Storage I/O. **Command Line Arguments.**
Text Book(s)	1. Tony Gaddis, Starting out with C++: from control structures through objects, 7th Ed., Addison-Wesley, 2012, ISBN 978-0-13-257625-3
Reference Material	1. D.S. Malik, C++ Programming, From Problem Analysis to Program Design, 5th Ed., Course Technology, 2011, ISBN: 978-0-538-79813-6 2. Brian W. Kernighan, Dennis M. Ritchie, The C Programming Language, 2nd Ed., Prentice Hall, 1988, ISBN: 978-0131103627. 3. Bjarne Stroustrup, The C++ Programming Language, 4th Edition, Addison-Wesley, 2013, ISBN 978-0321563842.

Course Title	**Communication and Presentation Skills**
Course Code	**GE-164**
Credit Hours	3
Category	General Education
Prerequisite	None
Co-Requisite	None
Follow-up	None
Course Description	**Communication:** Defining Communication, Effective Communication, Perspectives in Communication skills, Organizational Communication, Communication across culture, Nonverbal communication, Communication Styles. Forms of Written Communication; Memos; Good News and Neutral Messages; Bad News Messages; Basic listening skills, Impromptu Presentation, The seven Cs of effective communication, Communication and Technology, Working in Groups, Communication Instruments: choice of visual aids, Making Oral Presentations, Strategies for Successful Interpersonal Communication, Strategies for Successful Business and Group Meetings, Effective Written Communication, Appearance and design of business messages, Process of Preparing Effective Business Messages; Organizing and Finalizing Reports/ Proposals. **Special Topics in Business Communication:** Business Letters; Proposals and Business Plans; Writing Proposals and Reports; Short Reports; Long Formal Reports; Specification Documents; Review of Language; Writing Technical Research Reports; Documentation and Research Citation; Job Application and Resumes.
Text Book(s)	1. Herta A. Murphy, Herbert W. Hildebrandt and Jane P. Thomas, Effective Business Communication, 7th Edition, McGraw Hill India, 2008, ISBN-13: 978-0070187757 2. Courtland L. Bovee, John V. Thill, Business Communication Today, 12th Edition, Prentice Hall, 2013, ISBN-13: 978-0132971294
Reference Material	1. D. O'Hair, J. S. O'Rourke, M.J. O'Hair, Business Communication: A Framework for Success, 1st Edition, Cengage Learning, 2000, ISBN-13: 978-0324073508 2. J. M. Penrose, R. W. Rasberry, R. J. Myers, Advance Business Communication, 4th Edition, South-Western Publishers, 2000, ISBN-13: 978-0324037395

8. UNIVERSITY ELECTIVE COURSES

Course Title	**Introduction to Economics**
Course Code	**UE-171**
Credit Hours	3
Category	Economy Related University Elective
Prerequisite	None
Co-Requisite	None
Follow Up	None
Course Description	Nature and scope of economics, three basic economic problems, the economic role of Government, Theory of consumer behavior, Analysis of market mechanism, Determinants of market forces, Theory of demand and supply, Determination of a value of a commodity, Elasticity of demand and supply, Types of markets, Revenue curves, Cost curves, Software industry analysis, Factor market analysis, Wage determination, problems of labor, capital, interests, entrepreneur & profit, National accounting, national income measurement, GDP, income and growth, National income application-standard of living, Trade development authority, Aggregate demand and supply, Taxation, efficiency, applications to international trade, costs of Taxes & subsidies, Money, finance and the concepts of open economy, Inflation & Unemployment, Types of States, Federal Budget, Role of Government-fiscal policy, Central Bank – Monetary Policy, Global Economics, Free Trade and Protection (WTO).
Text Book(s)	1. Campbell R. McConnell, Stanley L. Brue and Sean Masaki Flynn, Economics, 21st Edition, McGraw-Hill Education, 2017, ISBN-10: 1259723224, ISBN-13: 978-1259723223.

Course Title	**Arabic Language**
Course Code	**UE-172**
Credit Hours	2
Category	Foreign Language Related University Elective
Prerequisite	None
Co-Requisite	None
Follow Up	None
Course Description	حروف المنفصلة، الضمائر التوصيفی، المرکب الاضافی، المرکب متصله، الضمائر الحرف، الفعل، ، الاسم الفعل المضارع، الفعل الماضی، الفعل الجمع، الواحد والمونث، المذکر الفعلیہ، الجملۃ الاسمیۃ، الجملہ الجر، المختارۃ، الاناشید النبویۃ، الأحادیث المعتل، الفعل الصحیح، الفعل المتصلۃبالافعال، الضمائر المضعف، قواعد بلحاظ تشریح کی الفاظ مع ترجمہ کا سیارے پہلے الحروف، المخارج الھجا، القصص،حروف
Text Book(s)	"العربی اللسان"
Reference Material	1. دوم اول، حصہ ، معلم کا عربی 2. الصرف تسہیل 3. النحو تسہیل 4. الراشده القراۃ 5. الرشیده القراۃ

Course Title	**Translation of Holy Quran**
Course Code	**HQ-002**
Credit Hours	1
Category	Quran and Sunnah
Prerequisite	HQ-001: Translation of Holy Quran
Follow-up	HQ-003: Translation of Holy Quran
Course Description	**Surah Al-Nisa to Surah Al-An'am** (سورۃالنساء تا سورۃالانعام):Translation of Verses into English or Urdu language (آیات کا انگریزی یا اردو زبان میں ترجمہ),Meaning of Qur'anic words into English or Urdu language (انگریزی یا اردو زبان میں قرآنی الفاظ کے معانی), **Attached pronouns**(ضمائر متصلہ):Use attached pronouns with word and give their meanings (لفظ کے ساتھ ضمائر متصلہ لگائیں اور ان کے معنی بتائیں).

Course Title	Math Deficiency - II
Course Code	MD-002
Credit Hours	3*
Category	Deficiency Course
Prerequisite	None
Co-Requisite	None
Follow Up	Calculus and analytic Geometry
Course Description	**Complex Numbers:** Complex Numbers, Arithmetic with Complex Numbers (Add, subtract, multiply and divide complex numbers), Trigonometric Polar Form of Complex Numbers, De Moivre's Theorem and nth Roots, Recursion. **Sequences and Series**: Sigma Notation, Arithmetic Series, Geometric Series (Sum infinite and finite geometric series and categorize geometric series). **Counting with Permutations and Combinations. Basic Probability**. **Binomial Theorem**. **Limit:** Notation, Graphs to Find Limits, Tables to Find Limits, Substitution to Find Limits, Rationalization to Find Limits, One Sided Limits and Continuity. **Rate of Change:** Instantaneous Rate of Change, Tangent Lines and Rates of Change. **Derivatives:** The Derivative Function, Introduction to Techniques of Differentiation, The Product and Quotient Rules, Derivatives of Trigonometric Functions, The Chain Rule, Derivatives of Logarithmic Functions, Derivatives of Exponential and Inverse Trigonometric Functions. Increase, Decrease, and Concavity, Relative Extrema, Absolute Maxima and Minima. **Integrals:** An Overview of the Area Problem, Area Under a Curve, The Indefinite Integral, Integration by Substitution, The Definition of Area as a Limit; Sigma Notation, The Definite Integral.
Text Book(s)	1. Textbook of Algebra and Trigonometry Class XI is published by Punjab Textbook Board (PTB) Lahore, Pakistan. 2. Calculus and Analytic Geometry, MATHEMATICS 12 (Mathematics FSc Part 2 or HSSC-II), Punjab Text Book Board Lahore, Pakistan
Reference Material	1. Mark J. Christensen, Computing for Calculus, 1st Edition, Academic Press, (1st January 1981), 240 pages, ISBN: 9781483271088. 2. Lay, L. D. 2015. Probability and Statistics for Engineering and the Sciences, 9th Ed. Cengage Learning, Boston, MA, USA. 3. Howard, Anton, Irl Bivens, Stephen Davis, Calculus, 11th Ed, 2011, John Wiley & Sons, Inc. (1318 Pages)