Indrashil University

(Established by an Act under the Gujarat Private Universities Act, 2009)

A Life Sciences University

Sustained Excellence with Relevance

School of Engineering

Computer Science and Engineering

Proposed Course Curriculum

w.e.f. Academic Year 2019-20

B.TECH. (All Branches) ENGINEERINGPROGRAMME (w.e.f. academic year 2019-20)

Semester : 1	**Minimum Semester Credit Required :21 Cumulative Semester Credit Required : 21**		
Course Code	**Subject Name**	**L-T-P**	**Credits**
CHE101	Engineering Chemistry	**3-0-2**	**4**
MATH 101	Engineering Mathematics-I	**3-1-0**	**4**
HS 101	Communication Skills – I	2-2-0	4
TA 101 / TA 102	Computer Programming / Engineering Graphics	**3-0-2/2-0-4**	**4/4**
HS 102	Soft Skills – I	2-0-0	0
ES 101 / ES 102	Engineering Mechanics / Electrical Technology	2-1-2/3-0-2	4/4
WS101	Engineering Workshop	0-0-2	1
	Total	**15-4-8/15-3-10**	**21/21**
Semester : 2	**Minimum Semester Credit Required :22 Cumulative Semester Credit Required : 43**		
Course Code	**Subject Name**	**L-T-P**	**Credits**
PHY 101	Engineering physics	**3-0-2**	**4**
MATH 102	Engineering Mathematics-II	**3-1-0**	**4**
HS 103	Communication Skills – II	2-2-0	4
TA 102 / TA 101	Engineering Graphics / Computer Programming	**2-0-4/3-0-2**	**4/4**
HS 104	Soft Skills – II	2-0-0	0
ES 102 / ES 101	Electrical Technology / Engineering Mechanics	3-0-2/2-1-2	4/4
ES 103	Environmental science	2-0-0	2
	Total	**17-3-8/17-4-6**	**22/22**

CURRICULUM FOR B.TECH. COMPUTER SCIENCE AND ENGINEERING PROGRAMME

Semester : 3	**Minimum Semester Credit Required : 21 Cumulative Semester Credit Required : 64**		
Course Code	**Subject Name**	**L-T-P**	**Credits**
MATH302	Discrete Mathematics	3-1-0	4
CS301	Data Structures	3-0-2	4
CS302	Object Oriented Programming	3-0-2	4
CS303	Digital Logic Design	3-0-2	4
CS304	Database Management System	3-0-2	4
CS305	Engineering Innovation Project – I	0-0-2	1
HS301	SS-III	2-0-0	0
	Total	**17-1-10**	**21**
Semester : 4	**Minimum Semester Credit Required : 22 Cumulative Semester Credit Required : 86**		
Course Code	**Subject Name**	**L-T-P**	**Credits**
MATH401	Probability and Statistics	3-1-0	4
CS401	Operating System	3-0-2	4
CS402	Web Technology	3-0-2	4
CS403	Computer Organization and Architecture	3-1-0	4
CS404	Computer Networks	3-0-2	4
CS405	Engineering Innovation Project – II	0-0-2	1
HS401	SS-IV	2-0-0	0
CS406	Group Related Activity	0-0-1	1
	Total	**17-2-9**	**22**

Semester : 5	Minimum Semester Credit Required : 24 Cumulative Semester Credit Required : 110		
Course Code	**Subject Name**	**L-T-P**	**Credits**
CS501	Design and Analysis of Algorithms	3-1-2	5
CS502	Theory of Computation	3-1-0	4
CS503	Cyber Security	3-0-2	4
CS5E1	Elective-1	3-0-0	3
CS5E2	Elective-2	3-0-0	3
CS504	Engineering Innovation Project III	0-0-2	1
HS501	SS-V	2-0-0	0
CS505	Industrial Practice*	0-0-0	4
	Total	**17-2-6**	**24**
Semester : 6	**Minimum Semester Credit Required : 19 Cumulative Semester Credit Required : 129**		
Course Code	**Subject Name**	**L-T-P**	**Credits**
CS601	Compiler Design	3-1-0	4
CS602	Software Engineering	3-0-2	4
CS603	Artificial Intelligence	3-0-2	4
CS6E1	Elective-3	3-0-0	3
CS6E2	Elective-4	3-0-0	3
CS604	Engineering Innovation Project IV	0-0-2	1
HS601	SS-VI	2-0-0	0
	Total	**17-1-6**	**19**

Semester : 7	Minimum Semester Credit Required : 24 Cumulative Semester Credit Required : 153		
Course Code	**Subject Name**	**L-T-P**	**Credits**
CS701	Data Science	2-0-2	3
CS702	Machine Learning	3-0-2	4
CS7E1	Elective-5	3-0-0	3
CS7E2	Elective-6	3-0-0	3
HS701	Foreign Language	3-0-0	3
IU7E1	Elective-7	3-0-0	3
CS704	Comprehensive Viva	0-0-0	1
CS705	Industrial Practice *	0-0-0	4
	Total	**17-0-4**	**24**
Semester : 8	**Minimum Semester Credit Required : 15 Cumulative Semester Credit Required : 168**		
Course Code	**Subject Name**	**L-T-P**	**Credits**
CS801	Industrial Practice III / 2 Courses + Project III / Thesis / Entrepreneur project	0-0-30	15
	Total	**0-0-30**	**15**

***Industry Practice will be of 6 to 8 weeks during summer vacations only.**

Specialization

Big Data & Data Science

Data Mining and Warehousing
Big data Analytics for Programmers
Big data with Hadoop
Advance Database Management
Digital System Design
Cryptography and Network Security
Advance Computer Architecture
Business Intelligence using Cognos insight
Real Time System

Machine Learning

Mathematics for Machine Learning
Machine Learning for Data Analysis
Deep Learning
Neural Networks
Advanced Machine Learning
Applied Data Science with Python
Sequence Models
Applied AI with Deep Learning
Data Analysis and Interpretation
Natural Language Processing
Automation

Cyber Security

Cryptography and Network Security
Ethical Hacking
Web and Database Security
Cyber Crimes, Ethics and Laws
Defense Programming in Python
Internetworking and Security
Risk Assessment and Security Audit
Cyber Forensics
Wireless Security

Artificial Intelligent

Human-Computer Interaction
Artificial Intelligent-n Search & Logic
Computation Neuroscience
AI for Computer Games and Virtual Humans.
AI with Speech and Multimodal Interaction
Artificial intelligence and Intelligent Agents

Embedded Systems and IoT

Wireless Network
Sensors Device and Components
Industrial IoT
Hybrid Application Development
Networking and Internet
Embedded System Design
Embedded Programming

Cloud/Blockchain

ERP on Cloud
Cloud Computing
Blockchain Technology
Computer Vision
Augmented Reality
Additive Manufacturing (3D printing)

Open Elective:
Design Thinking

Foreign Language:
Japanese, French, German

Soft Social Skill Courses:

1. English
2. Communication Skill
3. Ethics and Values
4. Economics for Engineers
5. Laws for Engineers
6. Entrepreneurship Development
7. Organizational Behaviour

Indrashil University

School of Engineering

Third Semester, 2019-20

Course Syllabus

Course Code:	**CS301**
Course Title:	**Data Structures**
Credit Structure (L-T-P-C):	**3-0-2-4**
Instructor in Charge:	

Learning Outcome of the Course:

After learning the course the students should be able:

1. Differentiate primitive and non primitive structures
2. Design and apply appropriate data structures for solving computing problems.
3. Apply sorting and searching algorithms to the small and large data sets.

Syllabus:

Unit 1: Introduction to Data Structure [4 Hours]

Basic Terminology, Internal representation of Primitive Data structure: Integers, Floating point numbers, Packed decimal, Characters, Structures, Unions, and Pointers.

Unit 2: Basic Data Types [12 Hours]

Arrays: Definition, Memory organization, Operations on Arrays: Traversing, Insertion, Deletion, Updating, Resizing.

Stacks: Basic operations, Stack, Dstack and applications

Queues: Operations of queues, Circular Queue, Priority Queue, Dequeue, Application of queues

Linked list: Singly linked lists and memory representation, Operations of Link list (Traversing, Searching, Insertion, Deletion, inversion, concatenation, copying and comparison, allocation and deallocation), doubly linked list and operations, Circular Link list, Multilevel link list

Unit 3: Trees [9 Hours]

Introduction, Binary Trees and their representation, Operations on Binary trees: Creation, transformation of trees into binary trees, traversal, Searching, Insertion and Deletion. Type of trees: Complete Binary trees, AVL trees, Red-Black trees, B trees Application

Unit 4: Graph [8 Hours]

Formal Introduction, types of graph, Representation of graphs: Sequential, List structure, Adjacency list, multilinked representation, Search in directed and undirected graphs, BFS, DFS, Transversal Connected Component and Spanning trees

Unit 5: Illustrated Algorithms [9 Hours]

Sorting (Bubble, Selection, Quick, Merge, Radix, Bucket sort, Heap sort), Dictionaries, hashing, analysis of collision resolution techniques, Searching (Linear Search, Binary Search), Character String and different string operations.

Unit 6: Hashing and File Structures [9 Hours]

Hashing: The symbol table, Hashing Functions, Collision Resolution Techniques, File Structure: Concepts of fields, records and files, Sequential, Indexed and Relative/Random File Organization, Indexing structure for index files, hashing for direct files, Multi-Key file organization and access methods

TEXT BOOK(S):

1. An Introduction to Data Structures with Applications. by Jean-Paul Tremblay & Paul G.Sorenson Publisher-Tata McGraw Hill.

REFERENCE BOOKS:

1. Classic Data Structures By D. Samanta Publisher - PHI Learning Private Limited.
2. Data Structures using C & C++ -By Ten Baum Publisher – Prenctice-Hall International.
3. Fundamentals of Computer Algorithms by Horowitz, Sahni,Galgotia Pub. 2001 ed.
4. Fundamentals of Data Structures in C++-By Sartaj Sahani.
5. Data Structures: A Pseudo-code approach with C -By Gilberg & Forouzan Publisher Thomson.

Data Structures Operations Lab:

10-12 experiments based on the syllabus covered as above will be performed and evaluated on Continuous basis.

Evaluation Scheme:

Continuous evaluation process comprising of components like attendance, assignment, class tests, practical, Comprehensive examinations, etc.

Indrashil University

School of Engineering

Third Semester, 2019-20

Course Syllabus

Course Code:	**CS302**
Course Title:	**Object Oriented Programming**
Credit Structure (L-T-P-C):	**3-0-2-4**
Instructor in Charge:	

Learning Outcome of the Course:

After learning the course the students should be able to:

- Understand object oriented programming concepts and implement in java.
- Comprehend building blocks of OOPs language, inheritance, package and interfaces.
- Identify exception handling methods.
- Implement multithreading in object oriented programs

Syllabus:

Unit 1: Basics of Java [5 Hours]

Creation of Java, Features of Java, Byte Code and Java Virtual Machine, JDK, Data types, Operator, Type Conversion, Control Statements – If , else, nested if, if-else ladders, Switch, while, do-while, for, for-each, break, continue.

Unit 2: Array and String [4 Hours]

Single and Multidimensional Array, Alternative array declaration statements, String class, StringBuffer class, Operations on string, Command line argument, Use of Wrapper Class.

Unit 3: Classes , Objects and Methods [7 Hours]

Class fundamentals, Declaring Objects, Object reference, Constructor, Constructor Overloading, Method Overloading, Recursion, Passing and Returning object form Method, new operator, this and static keyword, Garbage Collection, finalize() method, Access control, modifiers, Nested class, Inner class, Anonymous inner class.

Unit 4: Inheritance and Interface [7 Hours]

Use of Inheritance, Inheriting Data members and Methods, constructor in inheritance, Multilevel Inheritance – method overriding Handle multilevel constructors – super keyword, Stop Inheritance - Final keywords, Creation and Implementation of Abstract class and Interface, Interface reference, instanceof operator, Interface inheritance, Dynamic method dispatch, between Abstract Class and interface, Understanding of System.out.println – Statement.

Unit 5: Packages and Exception Handling [5 Hours]

Use of Package, CLASSPATH, Import statement, Static import, Access control, Exception and Error, Use of try, catch, throw, throws and finally, Built in Exception, Custom exception, Throwable Class.

Unit 6: Multithreaded Programming [5 Hours]

Use of Multithread programming, Thread class and Runnable interface , Thread priority, Thread synchronization, Thread communication, Deadlock.

Unit 7: Managing I/O [4 Hours]

Introduction to Stream, Byte Stream, Character stream, Readers and Writers, File Class, File InputStream, File Output Stream, InputStreamReader, OutputStreamWriter, FileReader, FileWriter, Buffered Reader

Unit 8: Event and GUI programming [7 Hours]

Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swing.

REFERENCE BOOKS:

1. Java Fundamentals A comprehensive introduction By Herbert Schildt, Dale Skrien, McGraw Hill Education
2. Programming with Java A Primer – E.Balaguruswamy,Mc Grawhill
3. The Complete Reference, Java 2 (Fourth Edition),Herbert Schild, - TMH.
4. Core Java Volume-I Fundamentals Horstmann & Cornell, - Pearson Education. - Eight Edition.
5. Programming in Java, Sachin Malhotra & Saurabh Chaudhary, Oxford University Press.

Object Oriented Programming Operations Lab:

10-12 experiments based on the syllabus covered as above will be performed and evaluated on continuous basis.

Evaluation Scheme:

Continuous evaluation process comprising of components like attendance, assignment, class tests, Practical, comprehensive examinations, etc.

Indrashil University

School of Engineering

Third Semester, 2019-20

Course Syllabus

Course Code:	**CS303**
Course Title:	**Digital Logic Design**
Credit Structure (L-T-P-C):	**3-0-2-4**
Instructor in Charge:	

Learning Outcome of the Course:

After learning the course the students should be able to:

1. To explain about digital number systems and logic circuits.
2. The student should be able to solve logic function minimization.
3. The students should be able to differentiate between combinational and sequential circuits such as decoders, encoders, multiplexers, demultiplexer, flip-flops, counters, registers. They should be able to design using FSM. In the laboratory, they should be able to verify the functions of various digital integrated circuits.
4. The students should be able state the specifications of logic families.

Syllabus:

Unit 1: Number System [5 Hours]

Decimal, Binary, Octal, Hexadecimal number system, Conversion of numbers from one number system to other, complement method of subtraction, 9's and 10's compliment method, 1's and 2's complement method, Floating point numbers.

Unit 2: Binary Codes [4 Hours]

Weighted and Non-weighted code, Self complementing course, cyclic course, 8421 BCD code, XS-3 code, Gray code, Binary to Gray conversion, Gray to Binary conversion, Parity bit and its importance in error detecting.

Unit 3: Boolean Algebra & Logic Gates [6 Hours]

AND, OR, NOR, NOT, NAND, X-OR, Inhibit circuits.

Axioms and laws of Boolean algebra, D'morgans theorem, Duality, Reduction of Boolean expression, converting AND/OR/INVERT logic to NAND/NOR logic Simplification of Boolean expression using Karnaugh Map and Quine- Mcclusky Methods Expansion of a boolean expression to SOP and POS form, Minimization of POS and SOP expressions for 2 to 6 variables, Don't care conditions, Combinational logic, Quine- Mcclusky methods.

Unit 4: Combinational Circuits [5 Hours]

The Half-adder, The Full-adder, The Half-subtractor, The Full-Subtractor, Parallel Binary Adders, The Look-Ahead Carry Adder, IC Parallel Adders, Two's Complement Addition And Subtraction Using Parallel Adders, Serial Adders, BCD adder, Binary Multipliers, Code converters, Parity bit Generators/Checkers, Comparators, IC comparators, Decoders, BCD to 7-Segment Decoders, Display devices, Encoders, Keyboard Encoders, Priority Encoders, Multiplexers, Applications of Multiplexer, Demultiplexers.

Unit 5: Flip-Flops And Timing Circuits [5 Hours]

S-R Flip-flop, JK Flip-flop, D Flip-flop, T Flip-flop, Edge –Triggered Flipflop, Master-slave Flip-flop, and Applications of Flip-flops.

Shift Registers: Serial-in Serial-out Shift register, Serial-in Parallel-out Shift register, Parallel-in Serial-out Shift register, Parallel-in Parallel-out Shift register, Bi-directional shift register, Universal shift register, Dynamic shift register, Applications of shift registers.

Unit 6: Msi & LSI Circuits and Their Applications [5 Hours]

Introduction, Examples of Useful Digital Circuits, Arithmetic Circuit, Comparators, Multiplexers, Code Converters, Wired Logic, Practical Aspects of Wired Logic and Bus Oriented Structures.

Unit 7: Logic Families [3 Hours]

Digital IC specification terminology, Logic families, TTL, Open collector gate, TTL subfamilies, IIL, ECL, MOS, CMOS, Dynamic MOS Logic.

Unit 8: Memories And Programmable Logic Devices [5 Hours]

Memory types and terminology, Read Only memory, Semiconductor RAMs, Non-volatile RAMs, Sequential memories, Magnetic memories, Optical Disk memory,

Charge coupled devices, Programmable Logic Devices – PROM, PLA, PAL, CPLD, and FPGA

TEXT BOOK:

1. M. Morris Mano, Digital logic and computer Design, PHI

REFERENCE BOOK:-

1. A. Anand Kumar, Fundamentals of Digital Circuits, PHI
2. R.P.Jain, Digital Electronics, TMH
3. B. Somanathan Nair, Digital Electronics and Logic Design, PHI
4. Thomas A. Demassa and Zack Ciccone , Digital Integrated Circuits, Wiley Publications.

Digital Logic Design Operations Lab:

10-12 experiments based on the syllabus covered as above will be performed and evaluated on continuous basis.

Tutorials:

8 to 10 tutorials will be given based on the syllabus covered as above.

Evaluation Scheme:

Continuous evaluation process comprising of components like attendance, assignment, class tests, practical, comprehensive examinations, etc.

Indrashil University

School of Engineering

Third Semester, 2019-20

Course Syllabus

Course Code:	**CS304**
Course Title:	**Database Management System**
Credit Structure (L-T-P-C):	**3-0-2-4**
Instructor in Charge:	

Learning Outcome of the Course:

After learning the course the students should be able to:

- Evaluate business information problem and find the requirements of a problem in Terms of data.
- Understand the uses the database schema and need for normalization.
- Design the database schema with the use of appropriate data types for storage of data in Database.
- Use different types of physical implementation of database.
- Use database for concurrent use.

Syllabus:

Unit 1: Introduction to DBMS [5 Hours]

General introduction to database systems; Database – Purpose of DBMS, data models, database management system, three-schema architecture of a database, challenges in building a DBMS, various components of a DBMS, users and DBA.

Unit 2: Relational Algebra Operators [9 Hours]

Selection, projection, cross product, various types of joins, division, example queries, tuple relation calculus, domain relational calculus, converting the database specification in E/R notation to the relational schema, Functional Dependency – definition, trivial and non-trivial FD, closure of FD set, closure of attributes, irreducible set of FD, Normalization – 1Nf, 2NF, 3NF, Decomposition using FD-dependency preservation, BCNF, Multi- valued dependency, 4NF, Join dependency and 5NF

Unit 3: E/R Model [8 Hours]

Conceptual data modeling - motivation, entities, entity types, various types of attributes, relationships, relationship types, E/R diagram notation, examples, Relational Data Model - Concept of relations, schema-instance distinction, keys, referential integrity and foreign keys, generalization, specialization, aggregation, reduction to E-R database schema.

Unit 4: SQL [7 Hours]

Introduction, data definition in SQL, table, key and foreign key definitions, update behaviors Basics of SQL, DDL,DML,DCL, structure – creation, alteration, defining constraints – Primary key, foreign key, unique, not null, check, IN operator, Functions - aggregate functions, Built-in functions – numeric, date, string functions, set operations, sub-queries, correlated sub-queries, Use of group by, having, order by, join and its types, Exist, Any, All , view and its types, transaction control commands – Commit, Rollback, Save point.

Unit 5: Data Storage and Indexes [6 Hours]

File organizations, primary, secondary index structures, various index structures - hash-based, dynamic hashing techniques, multi-level indexes, B+ trees.

Unit 6: Transaction Processing and Error Recovery [6 Hours]

Concepts of transaction processing, ACID properties, concurrency control, locking based protocols for CC, error recovery and logging, undo, redo, undo-redo logging and recovery methods.

Unit 7: Query Processing & Query Optimization [6 Hours]

Overview, measures of query cost, selection operation, sorting, join, evaluation of expressions, transformation of relational expressions, estimating statistics of expression results, evaluation plans, and materialized views.

Unit 8: Introduction to MongoDB and Hana Databases. [4 Hours]

NoSQL Databases, CAP Theorem, Features of MongoDB?, Installation overview, Documents, Collections, Databases, Starting and stopping MongoDB

Architecture, Download & Install, SAP HANA SQL, Data Type, Operator, SQL FUNCTIONS, SQL EXPRESSIONS, SQL Stored Procedure

TEXT BOOK:

1. R. Elmasri and S. B. Navathe, Fundamentals of Database systems, Sixth Edition, Addison Wesley 2010.

REFERENCE BOOK:

1. An introduction to Database Systems, C J Date, Addition-Wesley.
2. Database System Concepts, Abraham Silberschatz, Henry F. Korth & S. Sudarshan, McGraw Hill.
3. Understanding SQL by Martin Gruber, BPB.
4. SQL- PL/SQL by Ivan bayross.
5. Oracle – The complete reference – TMH /oracle press.
6. https://www.gangboard.com/database-training/mongodb-training
7. https://www.guru99.com/sap-hana-tutorial.html

Database Management System Operations Lab:

10-12 experiments based on the syllabus covered as above will be performed and evaluated on continuous basis.

Evaluation Scheme:

Continuous evaluation process comprising of components like attendance, assignment, class tests, practical, comprehensive examinations, etc.

Date:

Indrashil University

School of Engineering

Computer Science and Engineering

Third Semester, 2019-20

Course Syllabus

Course Code:	**MATH 302**
Course Title:	**Discrete Mathematics**
Credit Structure (L-T-P-C):	**3-1-0-4**
Instructor in Charge:	

Learning Course Outcome:

After learning the course the students should be able to:

1. write an argument using logical notation and determine if the argument is or is not valid.
2. demonstrate the ability to write and evaluate a proof or outline the basic structure of and giveexamples of each proof technique described.
3. explain the basic principles of sets and operations in sets.
4. apply counting principles to determine probabilities.
5. demonstrate an understanding of relations and functions and be able to determine theirproperties.
6. demonstrate different traversal methods for trees and graphs.
7. model problems in Computer Science using graphs and trees.

Syllabus:

Unit-I **10 Hours**

Propositional logic: Syntax, semantics, valid, satisfiable and unsatisfiable formulas, encoding and examining the validity of some logical arguments. **Proof techniques:** forward proof, proof by contradiction, contrapositive proofs, proof of necessity and sufficiency.

Unit-II **9 Hours**

Sets, relations and functions: Operations on sets, relations and functions, binary relations, partial ordering relations, equivalence relations, principles of mathematical induction. **Size of a set:** Finite and infinite sets, countable and uncountable sets, Cantor's diagonal argument and the power set theorem, Schroeder-Bernstein theorem.

Unit-III **6 Hours**

Introduction to counting: Basic counting techniques - inclusion and exclusion, pigeon-hole principle, permutation, combination, summations. Introduction to recurrence relation and generating function.

Unit-IV **14 Hours**

Algebraic structures and morphisms: Algebraic structures with one binary operation - semigroups, monoids and groups, congruence relation and quotient structures. Free and cyclic monoids and groups, permutation groups, substructures, normal subgroups. Algebraic structures with two binary operations - rings, integral domains and fields. Boolean algebra and Boolean ring.

Unit-V **6 Hours**

Introduction to graphs: Graphs and their basic properties - degree, path, cycle, subgraphs, isomorphism, Eulerian and Hamiltonian walks, graph coloring, planar graphs, trees.

References:

1. J. P. Tremblay and R.Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw-Hill
2. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw-Hill.
3. C. L. Liu, Elements of Discrete Mathematics, Tata McGraw-Hill.

4. Norman L. Biggs, Discrete Mathematics, Oxford University Press.
5. Kenneth Bogart, Clifford Stein and Robert L. Drysdale, Discrete Mathematics for Computer Science, Key College Publishing.
6. Thomas Koshy, Discrete Mathematics with Applications, Elsevier.
7. Ralph P. Grimaldi, Discrete and Combinatorial Mathematics, Pearson Education, Asia.

Open Source Contents (Provide if available)

1. https://nptel.ac.in/courses/106106094/

Evaluation Scheme:

- Continuous evaluation process comprising of components like attendance, tutorials, class tests, comprehensive examinations, etc.

Date:

Indrashil University
School of Engineering
Third Semester, 2019-20

Course Syllabus

Course Code :	**HS 301**
Course Title :	**Ethics and Values**
Credit Structure (L-T-P-C):	**2-0-0-0**
Instructor in Charge:	

Scope and Objective:

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

- Develop a familiarity with the mechanics of values and ethics.
- Exercise values, ethics in context of engineering profession, social and personal spectrum
- Apply values and ethics in personal, social, academic, global and professional life.

Learning Outcome of the Course:

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

- Correlate the concepts and mechanics of values and ethics in their life.
- Apply value and ethical inputs to solve social, global and civic issues.
- Apply such principles with reference to cultural values

Syllabus:

Unit-1 **06 Hours**

Introduction to Values: Definition and Concept, Types of Values, Values and its Application.

Unit-2 **06 Hours**

Elements and Principles of Values: Universal & Personal Values**,** Social, Civic & Democratic Values**,** Adaptation Models & Methods of Values.

Unit-3 **06 Hours**

Values and Contemporary Society: Levels of Value Crisis**,** Value Crisis Management, Cultural Values.

Unit-4 **05 Hours**

Ethics and Ethical Values: Definition and Concept**,** Acceptance and Application of Ethics**,** Ethical Issues and Dilemma**,** Universal Code of Ethics: Consequences of Violation

Unit-5 **07 Hours**

Applied Ethics: Professional Ethics**,** Organizational Ethics, Ethical Leadership**,** Ethics influenced by culture

Text books:

1. Values and Ethics in Business and Profession by Samita Manna, Suparna Chakraborti PHI Learning Pvt. Ltd., New Delhi.
2. Just a Job?: Communication, Ethics, and Professional life George Cheney Oxford University Press.

3. Professional Ethics and Human Values M. Govindarajan, S. Natarajan,V. S. Senthilkumar PHI Learning Pvt. Ltd.
4. Creating Values In Life: Personal, Moral, Spiritual,
5. Family and Social Values by Ashok Gulla Author House, Bloomington.

Reference Books:

E-Books:

1. Ethics for Everyone, Arthur Dorbin, 2009. (http://arthurdobrin.files.wordpress.com/2008/08/ethics-for-everyone.pdf)
2. Values and Ethics for 21st Century, BBVA. (https://www.bbvaopenmind.com/wp-content/uploads/2013/10/Values-and-Ethics-for-the-21st-Century_BBVA.pdf)

Evaluation Scheme:

Continuous evaluation process comprising of components like attendance, assignment, class tests, presentations, case studies, etc.

Since it is non-credit course, the students should be qualified/ non-Qualified depending upon their marks and grades obtained.

INDRASHIL UNIVERSITY

Course Name: Engineering Innovation Project-I

Course Code: CS305 **Course Credit: 01**

Instructor-in-charge: **L-T-P: 0-0-2**

Course Description:

The program requires each student to undertake a project with interdisciplinary group-size up to a maximum of 4 students. Each project group is supervised by up to a minimum of two faculty staffs. In Engineering Innovation Project (EIP), students will take CDIO initiative for their innovation. CDIO (Conceive-Design-Implement-Operate) is an innovative framework in the field of engineering that equips engineers with the knowledge in the state-of-the-art of technology. Conceive, design, implement and operate are the different components of research methodology for which the students have to perform during the incoming semesters III, IV, V and VI respectively. Total credit of this course is four with one credit in each semester. Followings are the steps that the groups of interdisciplinary students are required to follow to secure 4 credits.

1. **Conceive:** This is one of the basic components of CDIO initiative for project work. In this component, students have to conceive the idea of project through observations and literature reviews to define the problems to be solved. Conceive part of project work will be of one credit along with the duration of one semester (semester III).
2. **Design:** Whatever be the problems that were conceived in semester III will be continued to semester IV for designing/simulating/modeling of the defined objectives. This part of the project will also be of one credit for the duration of semester IV.
3. **Implement:** The implementation part will be done in V semester of the same credit 1. In this component, installation and testing will be required to be done for the designed project. The problems related to modeling and simulation can be implemented using different software.

4. **Operate:** In this component, output of solution of the well defined problems will be investigated or analyzed. Results so obtained after operating the installed system will be manipulated and validated with the previous research. This component has to be finished during semester VI and will be of 1 credit.

Course Objectives:

The Objectives of the course are:

- To introduce students to engineering projects.
- To provide students an opportunity to exercise their creative and innovative qualities in a group project environment**.**
- To excite the imagination of aspiring engineers, innovators and technopreneurs.
- To make students understand why innovation is integral to commercial success.
- To evaluated Innovation strategies and tactics through perspective ideation.

Course Outcomes:

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

- Demonstrate a sound technical knowledge of their selected project topic.
- Undertake problem identification, formulation and solution.
- Design engineering solutions to complex problems utilizing a systems approach.
- Conduct an engineering project
- Communicate with engineers and the community at large in written an oral forms.
- Demonstrate the knowledge, skills and attitudes of a professional engineer.

Evaluation Scheme:

The assessment of Engineering Innovation Project consists of assessment by supervisor in the following areas:

- Technical Knowledge and Skills
- Project Report
- Oral Presentation
- Attendance and Participation
- Interview
- Demonstration

1. **Conceive**

S. No.	Evaluation Component	Weightage	Date and Time
1	Synopsis of work plan	10%	One months after the commencement of semester III
2	Progress report/presentation-1	20%	Two months after the commencement of semester III
3	Progress report/presentation-2	20%	Three months after the commencement of semester III
4	Final Presentation/Viva	50%	End of semester III
Total		**100%**	

2. **Design**

S. No.	Evaluation Component	Weightage	Date and Time
1	Synopsis of design/drawing	10%	One months after the commencement of semester IV
2	Progress report/presentation-1	20%	Two months after the commencement of semester IV
3	Progress report/presentation-2	20%	Three months after the commencement of semester IV
4	Final Presentation/Viva	50%	End of semester IV
Total		**100%**	

3. **Implement**

S. No.	Evaluation Component	Weightage	Date and Time
1	Synopsis of installation	10%	One months after the commencement of semester V
2	Progress report/presentation-1	20%	Two months after the commencement of semester V
3	Progress report/presentation-2	20%	Three months after the commencement of semester V
4	Final Presentation/Viva	50%	End of semester V
Total		**100%**	

4. **Operate**

S. No.	Evaluation Component	Weightage	Date and Time
1	Synopsis of result extraction	10%	One months after the commencement of semester V
2	Progress report/presentation-1	20%	Two months after the commencement of semester V
3	Progress report/presentation-2	20%	Three months after the commencement of semester V
4	Final Presentation/Viva	50%	End of semester V
Total		**100%**	

Reference Book: NA

Indrashil University

School of Engineering

Fourth Semester, 2019-20

Course Syllabus

Course Code:	**CS401**
Course Title:	**Operating System**
Credit Structure (L-T-P-C):	**3-0-2-4**
Instructor in Charge:	

Learning Outcome of the Course:

After learning the course the students should be able to:

- Understand various generations of Operating System and functions of Operating System.
- Understand the concept of program, process and thread and analyze various CPU Scheduling Algorithms and compare their performance.
- Solve Inter Process Communication problems using Mathematical Equations by various methods.
- Compare various Memory Management Schemes especially paging and Segmentation in Operating System.
- Understand File Systems in Operating System like UNIX/Linux and Windows.
- Understand Input Output Management and use of Device Driver and Secondary Storage (Disk) Mechanism.

Syllabus:

Unit 1: Introduction [4 Hours]

Introduction: Basics of Operating Systems: Definition – Generations of Operating systems – Types of Operating Systems, OS Service, System Calls, OS structure: Layered, Monolithic, Microkernel Operating Systems – Concept of Virtual Machine

Unit 2: Process Management [6 Hours]

Processes: Definition , Process Relationship , Process states , Process State transitions , Process Control Block ,Context switching – Threads – Concept of multithreads , Benefits of threads – Types of threads Process Scheduling: Definition , Scheduling objectives ,Types of Schedulers ,Scheduling criteria : CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time (Definition only) ,Scheduling algorithms : Pre emptive and Non , pre emptive , FCFS –SJF – RR , Multiprocessor scheduling : Types , Performance evaluation of the scheduling.

Unit 3: Intercrosses Communication [6 Hours]

Race Conditions, Critical Section, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, and Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc., Scheduling, Scheduling Algorithms.

Unit 4: Deadlocks [6 Hours]

Definition, Deadlock characteristics, Deadlock Prevention, Deadlock Avoidance: banker's algorithm, Deadlock detection and Recovery.

Unit 5: Memory Management [7 Hours]

Basic Memory Management: Definition, Logical and Physical address map , Memory allocation : Contiguous Memory allocation –Fixed and variable partition – Internal and External fragmentation and Compaction , Paging : Principle of operation – Page allocation –Hardware support for paging – ,Protection and sharing – Disadvantages of paging. Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging (Concepts only) – Page Replacement policies : Optimal (OPT) , First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU)

Unit 6: I/O Management [4 Hours]

Principles of I/O Hardware: I/O devices, Device controllers , Direct memory access Principles of I/O Software: Goals of Interrupt handlers , Device drivers , Device independent I/O software , Secondary-Storage Structure: Disk structure ,Disk scheduling algorithm.

Unit 7: File Management [5 Hours]

File concept, access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous,linked,indexed), Free-space management (bit vector, linked list, grouping),directory implementation (linear list, hash table),efficiency & performance.

Unit 8: Security [3 Hours]

Security Environment, Design Principles Of Security, User Authentication, Protection Mechanism: Protection Domain, Access Control List

Unit 9: Unix/Linux Operating System [4 Hours]

Development of Unix/Linux, Role Of Kernel & Function Of Kernel, System Calls, Elementary Shell Programming, Directory Structure, System Administration

Unit 10: Introduction to Multiprocessor and Distributed Operating System [2 Hours]

REFERENCE BOOKS:

1. Operating System Concepts (8th Edition) by Silberschatz, Peter B. Galvin and Greg Gagne, Wiley Indian Edition (2010).
2. Modern Operating Systems (Third Edition) by Andrew S Tanenbaum, Prentice Hall India (2008).
3. Principles of Operating Systems by Naresh chauhan, Oxford Press (2014).
4. Operating Systems by D.M. Dhamdhere, Tata McGraw Hill 2nd edition.
5. Operating Systems (5th Ed) – Internals and Design Principles by William Stallings, Prentice Hall India, 2000.
6. UNIX Concepts and Applications (4th Edition)– by Sumitabha Das, Tata McGraw Hill.
7. UNIX Shell Programming – by Yashwant Kanetkar, BPB publications.

Operating System Operations Lab:

10-12 experiments based on the syllabus covered as above will be performed and evaluated on Continuous basis**.**

Evaluation Scheme:

Continuous evaluation process comprising of components like attendance, assignment, class tests, practical, comprehensive examinations, etc.

Indrashil University

School of Engineering

Fourth Semester, 2019-20

Course Syllabus

Course Code:	**CS402**
Course Title:	**Web Technology**
Credit Structure (L-T-P-C):	**3-0-2-4**
Instructor in Charge:	

Learning Outcome of the Course:

After learning the course the students should be able to:

- Describe the concepts of WWW including browser and HTTP protocol.
- List the various HTML tags and use them to develop the user friendly web pages.
- Define the CSS with its types and use them to provide the styles to the web pages at various levels.
- Develop the modern web pages using the HTML and CSS features with different layouts as per need of applications.
- Use the JavaScript to develop the dynamic web pages.
- Using Jquery and Bootstrap scripting to create responsive website.
- To develop proficiency in creating based applications using the Python Programming Language.

Syllabus:

Unit 1 : Introduction to WWW [02 Hours]

Concept of WWW, Internet and WWW, HTTP Protocol: Request and Response, Web browser and Web servers, Features of Web 2.0

Unit 2 : HTML and Style sheets [04 Hours]

HTML: Introduction and basics of HTML, Structure of HTML Document: Images and Multimedia, Links and webs, Document Layout, Creating Forms, Frames and Tables**.**

Style sheets: Introduction to CSS, basic syntax and structure using CSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists.

Unit 3 : JavaScript [08 Hours]

Client side scripting with JavaScript, variables, functions, conditions, loops and repetition, Pop up boxes, Advance JavaScript: JavaScript and objects, JavaScript own objects, the DOM and web browser environments, Manipulation using DOM, forms and validations, DHTML : Combining HTML, CSS and JavaScript, Events and buttons.

Unit 4 : XML [06 Hours]

Introduction to XML, uses of XML, simple XML, XML key components, DTD and Schemas, Using XML with application. Transforming XML using XSL and XSLT.

Unit 5 : jQuery [08 Hours]

Introduction of jQuery: What is jQuery?, Downloading and installing jQuery, Creating a simple jQuery enabled page, Overview of jQuery's features.

Retrieving and manipulating Page Content through jQuery: Basic jQuery selectors, basic jQuery filters, jQuery attribute filters, Child, visibility, and content filters, Form selectors and filters,

Traversing documents, Creating, getting, and setting content, Manipulating attributes, Inserting, Wrapping, replacing, and removing content.

Unit 6 : Bootstrap [08 Hours]

Introduction of Bootstrap: What is Bootstrap?, Bootstrap History, Use of Bootstrap, Where To get Bootstrap, Downloading Bootstrap, Bootstrap CDN.

Create First Web Page With Bootstrap: Bootstrap is Mobile –First, Containers, Basic Bootstrap Pages, Bootstrap Grids, Bootstrap Grid System, Grid Classes, Basic Structure of a Bootstrap Grid, Equal Columns, Unequal Columns**.**

Unit 7: Python [08 Hours]

Introduction to Python: The basic elements of python, Branching Programs, Control Structures, Strings and Input, Iteration.

Functions, Scoping and Abstraction: Functions and scoping, Specifications, Recursion, Global variables, Modules, Files, System Functions and Parameters**.**

TEXT BOOKS:

1. Web Technologies, Black Book, dreamtech Press.

REFERENCE BOOKS:

1. John V Guttag. “Introduction to Computation and Programming Using Python”, Prentice Hall of India
2. R. Nageswara Rao, “Core Python Programming”, dreamtech
3. Web Design, Joel Sklar, Cengage Learning.
4. Wesley J. Chun. “Core Python Programming - Second Edition”, Prentice Hall
5. Kenneth A. Lambert, “Fundamentals of Python – First Programs”, CENGAGE Publication
6. Jake Spurlock, “Bootstrap”, O’REILLY Publication
7. Ajdin Imsirovic, “Bootstrap 4 Cookbook”, Packt Publishing Limited
8. David Sawyer McFarland, “Javascript & jQuery” – The Missing Manual, Shroff Publishers & Distributors Pvt. Ltd.
9. Earle Castledine, “jQuery – Novice to Ninja 2e”, SitePoint Publisher

HTML and CSS:

https://www.tutorialspoint.com/html/index.htm

https://www.w3schools.com/html/

https://www.w3schools.com/css/

https://www.tutorialspoint.com/css/index.htm

Javascript:

https://www.tutorialspoint.com/javascript/index.htm,

https://www.w3schools.com/js/

XML:

https://www.tutorialspoint.com/xml/index.htm,

https://www.w3schools.com/xml/

jQuery:

https://www.tutorialspoint.com/jquery/index.htm,

https://www.w3schools.com/jquery/

Bootstrap:

https://www.tutorialspoint.com/bootstrap/index.htm,

https://www.w3schools.com/bootstrap/

Python Programming:

https://nptel.ac.in/courses/117106113/34,

https://www.w3schools.com/python/,

https://www.tutorialspoint.com/python/index.htm

Web Technologies Operations Lab:

10-12 experiments based on the syllabus covered as above will be performed and evaluated on

Continuous basis.

Evaluation Scheme:

Continuous evaluation process comprising of components like attendance, assignment, class tests, practical, comprehensive examinations, etc.

Indrashil University

School of Engineering

Fourth Semester, 2019-20

Course Syllabus

Course Code:	**CS403**
Course Title:	**Computer Organization and Architecture**
Credit Structure (L-T-P-C):	**3-1-0-4**
Instructor in Charge:	

Learning Outcome of the Course:

After learning the course the students should be able to:

- •To apply knowledge of the processor's internal registers and operations by use of a PC
- based microprocessor simulator.
- •To write assembly language programs and download the machine code that will provide
- solutions real-world control problems.
- •To eliminate or remove stall by altering order of instructions.
- •To write programs using the capabilities of the stack, the program counter, the
- status register and show how these are used to execute a machine code program.

Syllabus:

Unit 1: [5 Hours]

Register Transfer language, Register Transfer, Bus and Memory Transfers (Tree-State Bus Buffers,Memory Transfer), Arithmetic Micro-Operations, Logic MicroOperations, Shift Micro-Operations, Arithmetic logical shift unit CPU structure and functions, processor organization, ALU, data paths, internal registers, status flags; System bus structure: Data address and control buses.

Unit 2: [6 Hours]

Instruction codes, Computer registers, computer instructions, Timing and Control, Instruction cycle, Memory-Reference Instructions, Input output and interrupt Processor control, micro-operations, instruction fetch, hardwired control, microprogrammed control, microinstruction sequencing and execution.

Unit 3: [8 Hours]

Instruction set principles, machine instructions, types of operations and operands, encoding an instruction set, Machine Language, Assembly Language, assembler, Program loops, Programming Arithmetic and logic operations, addressing modes and formats.

Unit 4: [5 Hours]

Memory system, internal and external memory, memory hierarchy, cache memory and its working, virtual memory concept.

Unit 5: [4 Hours]

I/O organization; I/O techniques: interrupts, polling, DMA; Synchronous vs. asynchronous I/O.

Unit 6: [8 Hours]

Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Flynn's taxonomy.

Unit 7: [6 Hours]

Characteristics of Multiprocessors, Interconnection Structures, Inter-processor Arbitration, Inter-processor Communication and Synchronization, Cache Coherence, Shared Memory Multiprocessors.

REFERENCE BOOKS:

1. Mano, M.M., "Computer System Architecture" 3rd Ed., Prentice-Hall of India, 2004.
2. Rajaraman, V. and Radhakrishnan, T., "Computer Organization and Architecture", Prentice-Hall of India, 2007
3. Govindrajalu, B., "Computer Architecture and Organization", Tata McGraw- Hill, 2004
4. Stallings, W., "Computer Organization and Architecture", 5th Ed., Pearson Education, 2001
5. Hall, D.V., "Microprocessors and Interfacing", 2nd Ed., Tata McGraw-Hill, 2006
6. Brey, B.B., "The Intel Microprocessors", 6th Ed., Pearson Education, 2003

Tutorials:

8 to 10 tutorials will be given based on the syllabus covered as above.

Evaluation Scheme:

Continuous evaluation process comprising of components like attendance, assignment, class tests, practical, comprehensive examinations, etc.

Indrashil University

School of Engineering

Fourth Semester, 2019-20

Course Syllabus

Course Code:	**CS404**
Course Title:	**Computer Networks**
Credit Structure (L-T-P-C):	**3-0-2-4**
Instructor in Charge:	

Learning Outcome of the Course:

After learning the course the students should be able to:

1. Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies.
2. Specify and identify deficiencies in existing protocols, and then go onto formulate new and better protocols.
3. Analyze, specify and design the topological and routing strategies for an IP based networking infrastructure.
4. Have a working knowledge of datagram and internet socket programming.

Unit 1: Introduction to Computer Networks and Internet [7 Hours]

Understanding of network, networks topologies, OSI-TCP/IP Layering, protocols, Network services: connection-oriented and connectionless, Switching Techniques, Physical Layer: Different types of transmission media, types of address.

Unit 2: The Link Layer and Local Area Networks [10 Hours]

Introduction and link layer services, error-detection and correction techniques, Multiple access protocols, addressing, Ethernet, switches. Data Link Layer: Error detection (Parity, CRC), Sliding Window, Stop and Wait protocols. LAN: Design, specifications of popular technologies, interconnection of LANs; repeaters, bridges, routers. MAC Layer: Aloha, CSMA, CSMA/CD, CSMA/CA protocols. Examples: Ethernet, including Gigabit Ethernet and WiFi (802.11).

Unit 3: Network Layer [8 Hours]

Introduction, Virtual and Datagram networks, Internet Protocol, IPv6, study of router, IP protocol and addressing in the Internet, Routing algorithms, Broadcast and Multicast routing

Unit 4: Transport Layer [6 Hours]

Introduction and transport layer services, Multiplexing and Demultiplexing, Connection less transport (UDP), Principles of reliable data transfer, Connection oriented transport (TCP), Congestion control, readmission, Socket programming with TCP and UDP.

Unit 5: Application Layer [6 Hours]

Principles of computer applications, Web, Protocols: HTTP, FTP, E-mail, DN, SMTP.

Unit 6: Network Programming [2 Hours]

Socket Programming.

Unit 7: Session, Presentation, and Application Layers. [3 Hours]

Examples: DNS, SMTP, IMAP, HTTP, etc.

Unit 8: Network Security: **[6 Hours]**

Concepts of symmetric and asymmetric key cryptography. Sharing of symmetric keys - Diffie Hellman. Public Key Infrastructure. Public Key Authentication Protocols. Symmetric Key Authentication Protocols. Pretty Good Privacy (PGP), IPSec, Firewalls.

TEXT BOOKS:

1. W. Stallings. Data and Computer Communications, 7th Edition, Prentice Hall, 2004.
2. A. S. Tanenbaum. Computer Networks, 3rd Edition, Prentice Hall PTR, 1996.

REFERENCE BOOKS:

1. Computer Networking- A Top-Down approach, 5th edition, Kurose and Ross, Pearson.
2. Computer Networks- A Top-Down approach, Behrouz Forouzan, McGraw Hill.
3. Computer Networks (4th edition), Andrew Tanenbaum, Prentice Hall.
4. Computer Networking and the Internet (5th edition),Fred Halsall, Addison Wesley.
5. Data Communications and Networking (4th edition), Behrouz Forouzan, McGrawHill.
6. TCP/IP Protocol Suite (3rd edition), Behrouz Forouzan, McGraw Hill.

Computer Networking Operations Lab:

10-12 experiments based on the syllabus covered as above will be performed and evaluated on continuous basis.

Tutorials:

8 to 10 tutorials will be given based on the syllabus covered as above.

Evaluation Scheme:

Continuous evaluation process comprising of components like attendance, assignment, class tests, practical, comprehensive examinations, etc.

Date:

Indrashil University

School of Engineering

Computer Science and Engineering

Fourth Semester, 2019-20

Course Syllabus

Course Code:	**MATH 401**
Course Title:	**Probability & Statistics**
Credit Structure (L-T-P-C):	**3-1-0-4**
Instructor in Charge:	

Learning Course Outcome:

After learning the course the students should be able to:

8. apply basic probability theory to the real world problems;
9. evaluate mathematical expectation of a function of random variable;
10. demonstrate the situations where random variables like uniform, normal, binomial etc. can be used to describe it;
11. explain different types of estimation methods and their applications;
12. apply the concept of hypothesis testing to make right decisions;

Syllabus:

Unit-I **25 Hours**

Probability: Classical, relative frequency and axiomatic definitions of probability, addition rule and conditional probability, multiplication rule, total probability, Bayes' Theorem and independence. (5H)

Random Variables: Discrete, continuous and mixed random variables, probability mass, probability density and cumulative distribution functions, mathematical expectation, moments, moment generating function, Chebyshev's inequality. (5H)

Special Distributions: Discrete uniform, Binomial, Geometric, Poisson, Exponential, Gamma, Normal distributions. Functions of a Random Variable. (10H)

Joint Distributions: Joint, marginal and conditional distributions, product moments, correlation, independence of random variables, bivariate normal distribution. (5H)

Unit-II **20 Hours**

Sampling Distributions: The Central Limit Theorem, distributions of the sample mean and the sample variance for a normal population, Chi-Square, t and F distributions.(5H)

Estimation: The method of moments and the method of maximum likelihood estimation, confidence intervals for the mean(s) and variance(s) of normal populations. (5H)

Testing of Hypotheses: Null and alternative hypotheses, the critical and acceptance regions, two types of error, power of the test, the most powerful test and Neyman-Pearson FundamentalLemma, tests for one sample problems for normal populations. (10H)

References

1. Johnson, Richard A., Miller & Freund's Probability and Statistics for Engineers, 8th Edition, Pearson
2. 2. Miller I, Miller M, Freund JE., John E. Freund's mathematical statistics with applications. Boston: Pearson
3. 3. Ross, Sheldon M., Introduction to probability and statistics for engineers and scientists. Elsevier

4. Gupta, S.P., Statistical Methods, Sultan Chand and Sons, New Delhi
5. Runger, G.C. and Montgomery, D.C., Applied Statistics and Probability for Engineers, 6th Edition,John Wiley & Sons
6. Devore, J.L., Probability and Statistics for engineering and the sciences, 8th edition, Cengage Learning

Open Source Contents (Provide if available)

1. https://nptel.ac.in/courses/111105041/

Evaluation Scheme:

Continuous evaluation process comprising of components like attendance, tutorials, class tests, comprehensive examinations, etc.

Date:

Indrashil University

School of Engineering

Fourth Semester, 2019-20

Course Syllabus

Course Code:	**HS 401**
Course Title:	**Engineering Economics**
Credit Structure (L-T-P-C):	**2-0-0-0**
Instructor in Charge:	

Scope and Objective:

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

- To impart knowledge, with respect to concepts, principles and practical applications of Economics.
- To know the tactics of demand and supply of the market
- To understand the different market and its implications

Learning Outcome of the Course:

After learning the course the students should be able:

- To explain the relation between Science, Engineering, Technology and Economics.
- To deal with current marketing terminologies.
- To discuss the Indian economy in broad and sector specific perspective.

Syllabus:

Unit-1 **06 Hours**

Definition of Economics – various definitions, Nature of Economic problem, Production possibility curve Economic laws and their nature. Relation between Science, Engineering, Technology and Economics. Concepts and measurement of utility, Law of Diminishing Marginal Utility, Law of equi-marginal utility – its practical application and importance.

Unit-2 **07 Hours**

Meaning of Demand, Individual and Market demand schedule, Law of demand, shape of demand curve, Elasticity of demand, measurement of elasticity of demand, factors affecting elasticity of demand, practical importance & applications of the concept of elasticity of demand.
Meaning of production and factors of production; Law of variable proportions, Returns to scale, Internal and External economics and diseconomies of scale.

Unit-3 **07 Hours**

Various concepts of cost – Fixed cost, variable cost, average cost, marginal cost, money cost, real cost opportunity cost. Shape of average cost, marginal cost, total cost etc. in short run and long run.
Meaning of Market, Types of Market – Perfect Competition, Monopoly, Oligopoly, Monopolistic Competition (Main features of these markets)

Unit-4 **04 Hours**

Supply and Law of Supply, Role of Demand & Supply in Price Determination, effect of changes in demand and supply on prices.

Unit-4 **06 Hours**

Nature and characteristics of Indian economy (brief and elementary introduction), Privatization – meaning, merits and demerits. Globalisation of Indian economy – merits and demerits. Elementary Concepts of VAT, WTO, GATT & TRIPS agreement.

Text Books:

1. Principles of Economics: P.N. Chopra (Kalyani Publishers).
2. Modern Economic Theory – K.K. Dewett (S.Chand)

Reference Books:

1. A Text Book of Economic Theory Stonier and Hague (Longman's Landon)
2. Micro Economic Theory – M.L. Jhingan (S.Chand)
3. Micro Economic Theory – H.L. Ahuja (S.Chand)
4. Modern Micro Economics : S.K. Mishra (Pragati Publications)
5. Economic Theory – A.B.N. Kulkarni & A.B. Kalkundrikar (R.Chand & Co.)
6. Indian Economy: Rudar Dutt & K.P.M. Sundhram

Evaluation Scheme:

Continuous evaluation process comprising of components like attendance, assignment, class tests, presentations, case studies, etc.

Grades and Reports:

Since it is non-credit course, the students should be qualified/ non-Qualified depending upon their marks and grades.

INDRASHIL UNIVERSITY

Course Name: Engineering Innovation Project-I

Course Code: CS305 **Course Credit: 01**

Instructor-in-charge: **L-T-P: 0-0-2**

Course Description:

The program requires each student to undertake a project with interdisciplinary group-size up to a maximum of 4 students. Each project group is supervised by up to a minimum of two faculty staffs. In Engineering Innovation Project (EIP), students will take CDIO initiative for their innovation. CDIO (Conceive-Design-Implement-Operate) is an innovative framework in the field of engineering that equips engineers with the knowledge in the state-of-the-art of technology. Conceive, design, implement and operate are the different components of research methodology for which the students have to perform during the incoming semesters III, IV, V and VI respectively. Total credit of this course is four with one credit in each semester. Followings are the steps that the groups of interdisciplinary students are required to follow to secure 4 credits.

1. **Conceive:** This is one of the basic components of CDIO initiative for project work. In this component, students have to conceive the idea of project through observations and literature reviews to define the problems to be solved. Conceive part of project work will be of one credit along with the duration of one semester (semester III).
2. **Design:** Whatever be the problems that were conceived in semester III will be continued to semester IV for designing/simulating/modeling of the defined objectives. This part of the project will also be of one credit for the duration of semester IV.
3. **Implement:** The implementation part will be done in V semester of the same credit 1. In this component, installation and testing will be required to be done for the designed project. The problems related to modeling and simulation can be implemented using different software.
4. **Operate:** In this component, output of solution of the well defined problems will be investigated or analyzed. Results so obtained after operating the installed system will be manipulated and validated with the previous research. This component has to be finished during semester VI and will be of 1 credit.

Course Objectives:

The Objectives of the course are:

- To introduce students to engineering projects.
- To provide students an opportunity to exercise their creative and innovative qualities in a group project environment.
- To excite the imagination of aspiring engineers, innovators and technopreneurs.
- To make students understand why innovation is integral to commercial success.
- To evaluated Innovation strategies and tactics through perspective ideation.

Course Outcomes:

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

- Demonstrate a sound technical knowledge of their selected project topic.
- Undertake problem identification, formulation and solution.
- Design engineering solutions to complex problems utilizing a systems approach.
- Conduct an engineering project
- Communicate with engineers and the community at large in written an oral forms.
- Demonstrate the knowledge, skills and attitudes of a professional engineer.

Evaluation Scheme:

The assessment of Engineering Innovation Project consists of assessment by supervisor in the following areas:

- Technical Knowledge and Skills
- Project Report
- Oral Presentation
- Attendance and Participation
- Interview
- Demonstration

1. Conceive

S. No.	Evaluation Component	Weightage	Date and Time
1	Synopsis of work plan	10%	One months after the commencement of semester III
2	Progress report/presentation-1	20%	Two months after the commencement of semester III
3	Progress report/presentation-2	20%	Three months after the commencement of semester III
4	Final Presentation/Viva	50%	End of semester III
Total		**100%**	

2. Design

S. No.	Evaluation Component	Weightage	Date and Time
1	Synopsis of design/drawing	10%	One months after the commencement of semester IV
2	Progress report/presentation-1	20%	Two months after the commencement of semester IV
3	Progress report/presentation-2	20%	Three months after the commencement of semester IV
4	Final Presentation/Viva	50%	End of semester IV
Total		**100%**	

3. Implement

S. No.	Evaluation Component	Weightage	Date and Time
1	Synopsis of installation	10%	One months after the commencement of semester V
2	Progress report/presentation-1	20%	Two months after the commencement of semester V
3	Progress report/presentation-2	20%	Three months after the commencement of semester V
4	Final Presentation/Viva	50%	End of semester V
Total		**100%**	

4. Operate

S. No.	Evaluation Component	Weightage	Date and Time
1	Synopsis of result extraction	10%	One months after the commencement of semester V
2	Progress report/presentation-1	20%	Two months after the commencement of semester V
3	Progress report/presentation-2	20%	Three months after the commencement of semester V
4	Final Presentation/Viva	50%	End of semester V
Total		**100%**	

Reference Book: NA