Bachelor of Computer Applications Semester – III (2017-20)					
Subject Code	**Title**	**L**	**T**	**P**	**Credits**
CAT-201	Data Structures	3	0	0	3
CAT-202	Database Management System	3	0	0	3
CAT-204	System Software	3	0	0	3
CAT-208	Probability & Statistics	3	1	0	4
CAP-206	Data Structures Lab	0	0	4	2
CAP-207	Database Management System Lab	0	0	4	2
TDP-201	Soft skill	0	0	2	1
TDT-202	Aptitude	0	2	0	2
UCY-241	Social and Professional Ethics	0	0	0	0
UCY- 247	Gender Equality and Woman Empowerment	0	0	0	0
Total					**20**

CAT- 201	DATA STRUCTURES	L	T	P	C
	Total Contact Hours:45	3	-	-	3
	Applicable to which branch: BCA				
	Prerequisite: Knowledge of Programming in C				

Marks	
Internal: 40	External: 60

Course Objective

- To learn the systematic way of solving problems.
- To efficiently implement the different data structures.
- To efficiently implement solutions for specific problems.

Unit	Course Outcome
1.	Ability to implement arrays and understanding of different methods of organizing large amount of data.
2.	Ability to implement linked list, Stacks and operations on these data structures.
3.	To implement Trees and Graphs.

Content of the Syllabus

Unit-I

Introduction: Pointers and Dynamic memory allocation, Types of data structures, Mathematical notation and functions, **Algorithm Analysis**: Space Complexity, Time Complexity, Asymptotic Notation and Algorithmic complexity. Abstract Data Type.

Arrays & Structure: Linear Search, Binary Search (Recursive & iterative, Evaluation of Polynomial, Polynomial representation, Polynomial Addition.
Structures: Internal representation of structure, Self –referential structure.

Unit-II

Stack: Memory Representation of Stacks via arrays and Linked List, Stack Operations, Application of Stack, **Evaluation of Expression**: Evaluation of postfix expression, Infix to postfix and prefix forms for expressions.

Queue: Representation using array and linked List, Queue Operations, Types of queues, Applications of queue.

Linked List: Representation of linked list, Linked list operations (Create, Insertion, Printing, Deleting and Traversing), Circular Linked List, Double linked list.

Unit-III

Trees: Definition, Terminology, Representation, Binary tree: Representation and its types, Traversal (In-order, Pre-order, Post-order). Binary Search Tree, Heap, AVL/Height Balanced Tree

Graphs: Representation of Graphs, Adjacency Matrix and List, Indegree, out degree of graph,
Graph operation: Depth First Search and Breath First Search.
Sorting: Bubble sort, Selection sort, Insertion sort, Quick Sort and Merge Sort.

Text Books: -

- Seymour Lipschutz, Schaum's Outlines Series Data structures TMH.
- Data Structure using C/C++, R.S. EBalagaruswami, Tata McGraw-Hill Education.

Reference Material: –

- Introduction to Data Structures Applications, Trembley&Soreson, Second Edition, Pearson Education.
- A. Tannenbaum, Y. Lanhgsam and A.J.Augenstein, Data Structures Using C++, Prentice Hall of India, 1990.

<table>
<tr><th colspan="13">Subject to Program Outcome Relationship</th></tr>
<tr><td>Program outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td><td>l</td></tr>
<tr><td>Subject mapping</td><td></td><td></td><td>✓</td><td></td><td></td><td></td><td></td><td>✓</td><td></td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>Unit mapping</td><td></td><td></td><td>1</td><td></td><td></td><td></td><td></td><td>2-3</td><td></td><td>2</td><td>3</td><td></td></tr>
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<tr><td>Department</td><td colspan="12">UNIVERSITY INSTITUTE OF COMPUTING</td></tr>
<tr><td>CAT- 201</td><td colspan="12">DATA STRUCTURES</td></tr>
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CAT-202	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
	Total Contact Hours: 45	3	-	-	3
	Applicable to which branch: BCA				
	Prerequisite: MS Access, MS Excel.				

Marks	
Internal: 40	External:60

Course Objective

- To learn the fundamentals of data models and to conceptualize and depict a database system using ER diagram.
- To make a study of SQL and relational database.
- To know the fundamental concepts of transaction processing- concurrency control techniques and recovery procedure.

Unit	Course Outcome
1.	Ability to identify the characteristics of a DB, its architecture and modeling the real-world problem using ER Diagrams.
2.	Ability to differentiating between various file organizations methodologies.
3.	Ability to simplify a database using normalization and identifying the real time working of DB by studying the concept of Transactions.

Content of the Syllabus

Unit-I

Introduction: Overview of Database Management System: Various views of data Models, Schemes and Introduction to database Languages & Environments, Advantages of DBMS over file processing systems, Responsibility of Database Administrator. Three level architecture

Database Systems: Introduction to client/Server architecture.

Unit-II

Data Models: E-R Diagram (Entity Relationship), mapping Constraints, keys, Reduction of E-R diagram into tables. Network & Hierarchical Models.

File Organization: Sequential File, index sequential files, direct files, Hashing, B-trees Index files, Inverted Lists., Relational Models.
Relational Algebra & various operations (set operations, select, project, join, division), Order,

Relational calculus: Domain, Tuple, Well Formed Formula, specification, quantifiers, Introduction to Query Language, QBE.

Unit-III

Integrity constrains, functional dependencies & Normalization, 1st, 2nd, 3rd and BCNF.
Introduction to Distributed Data processing, Concurrency control: Transactions, Time stamping, Lock-based Protocols.

Text Books: -

- Fundamentals of Database Systems by R.Elmasri and S.B.Navathe, 3rd Edition, Pearson Education, New Delhi.
- An Introduction to Database Systems by C.J. Date, 7th Edition, Pearson Education, New Delhi.
- A Guide to the SQL Standard, Data, C. and Darwen, H.3rd Edition, Reading, Addison-Wesley Publications, New Delhi.

Reference Material: -

- Database System Concepts by A. Silberschatz, H.F.Korth and S.Sudarshan, 3rd Edition, McGraw-Hill, International Edition.
- SQL / PL/SQL, by Ivan Bayross, BPB Publications.

Subject to Program Outcome Relationship												
Program outcome	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**
Subject mapping		✓					✓	✓	✓		✓	
Unit mapping		1					1-3	1	2		3	
Category	**UC**	**B/F**			**DC**		**DE**		**UO**		**MNG**	
					√							
	HONS	**PROJECT**			**BW**		**PRACTICAL**		**TRAINING**		**SEMINAR**	
Department	**University Institute of Computing**											
CAT-202	**DATABASE MANAGEMENT SYSTEM**											

CAT-204	SYSTEM SOFTWARE	L	T	P	C
	Total Contact Hours: 45	3	-	-	3
	Applicable to which branch: BCA				
	Prerequisite: Information Technology, Computer Hardware.				

Marks	
Internal :40	External:60

Course Objective	
Unit	**Course Outcome**
1	Student will be able to understand the basic concept of operating system, its various types and components.
2	To understand the various scheduling algorithms that work on various processes.
3	Students will be able to understand the concept of memory management and deadlocks

Content of the Syllabus

UNIT-I

Introduction to System Software: Machine Structure, evolution of operating system, machine language.

Assembler: Elements of Assembly Language Programming, General design procedure, design of a Two Pass Assemblers, A Single Pass Assemblers Design.

UNIT-II

Macro and Macro Processors: Macro instructions, Features of a macro Facility: macro Instruction arguments, Conditional macro expansion, Macro calls within macros, Macro instruction defining macros, Advanced Macro Facilities, Implementation of simple macro processor, Two-pass algorithm, Implementation of macro calls within macros, Implementation within an assembler.

Linkers – Translated linked and load time addresses, relocation and linking concepts, Design of a linker, self-relocating programs.

UNIT-III

Loaders: Loader scheme, absolute loaders, Subroutine linkages, relocating loaders, Direct linking loaders, binders, linking loaders, overlays, Dynamic Binders, Design of an Absolute Loader, Design of a Direct-Linking Loader.

Compilers: Phases of Compiler Construction, Symbol Table, Top-down and bottom-up Parsing, Operator-Precedence Parsing, LR Parsers, Code Generation and Code Optimization, Memory management, Design & other issues.

Text Books

1. Donavan J., System Programming, Tata McGraw Hill (1993)

2. Dhamdhere D. M., System Programming and Operating System, Tata McGraw Hill (2007).

Reference Books

1. Beck L., System Software, Addison Wesley Publication (1996).
2. Aho A. V., Ullman J. D., Sethi R., Compilers Principles, Techniques and Tools, Pearson Education (2005).

Subject to Program Outcome Relationship												
Program outcome	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**
Subject mapping			✓			✓		✓		✓		
Unit mapping			**2**			**1**		**1**		2-3		
Category	**UC**	**B/F**			**DC**		**DE**		**UO**		**MNG**	
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	HONS	**PROJECT**			**BW**		**PRACTICAL**		**TRAINING**		**SEMINAR**	
Department	**University Institute of Computing**											
CAT- 204	**SYSTEM SOFTWARE**											

CAT-208	PROBABILITY & STATISTICS	L	T	P	C
	Total Contact Hours: 53	3	1	-	4
	Applicable to which branch: BCA				
	Prerequisite: must have knowledge about basic calculations.				

Marks	
Internal :40	**External:60**

Course Objective

To extend student's mathematical maturity and ability to deal with abstraction and to introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.

Unit	Course Outcome
1	Knowledge about mean, median and mode and its uses.
2	Knowledge about correlation and regression
3	They get the knowledge about probability and their use in real life.

Content of the Syllabus

Unit-I

Statistics: Introduction, Data Collection, Techniques of Data Collection, Data Analysis: Measure of Central Tendency, Frequency distribution, Mean, Median, Mode, Mean Deviation, Measures of Dispersion: Range Quartile Deviation, Mean Deviation, and Standard Deviation Standard Deviation.

Unit-II

Correlation &Regression: Meaning, Significance, Causes and Effect Relationship. Types of Correlation. Meaning, Uses of Regression Analysis, Relationship between Correlation and Regression analysis

Unit-III

Probability: Multiplication theorem on Probability. Conditional probability, independent events, total probability, Random variable and its probability distribution, mean and variance of haphazard variable. Repeated independent (Bernoulli) trials and Binomial distribution.

Text Books –

- Fundamental of Mathematical Statistics, S.C. Gupta, V.K. Kapoor, Sultan Chand and Company.

- Introduction to Probability & Statistics, Seymour Lipschutz, Jack Schiller, Jack Schiller S, McGraw-Hill Publishers.
- Probability & Statistics for Engg, Dr. J. Ravichandran ,Willey Publications
- Probability And Statistics, Dr. B. Krishna Gandhi, Dr. T.K.V Iyengar, M.V.S.S.N. Prasad, S. Chand Publishing Co.

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<tr><td>CAT- 208</td><td colspan="12">PROBABILITY & STATISTICS</td></tr>
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CAP - 206	DATA STRUCTURES LAB	L	T	P	C
	Total Contact Hours: 60	-	-	4	2
	Applicable to which branch: BCA				
	Prerequisite: Knowledge of C & C++				

Marks	
Internal: 60	External: 40

Course Objective

- To implement the systematic way of solving problems.
- To efficiently implement the different data structures.
- To efficiently implement solutions for specific problems.

Contents of the Practical

1) Revision of programs of Data Structures from pervious semester: Insertion Sort, Bubble Sort, Selection Sort, Linear Search, Binary Search.
2) Write a Program to Implement a Linked List.
3) Write a Program to Implement a Doubly Linked List.
4) Write a Program to Implement a Stack Dynamically.
5) Write a Program to Implement a Queue dynamically.
6) Write a Program to Implement a Circular Linked List.
7) Write a Program to Implement Binary Search Tree.
8) Write a Program to Implement In order.
9) Write a Program to implement Post order.
10) Write a Program to implement Pre order.
11) Write a Program to implement Heapsort.
12) Write a program to implement Breadth First search.
13) Write a program to implement Depth First search.
14) Write a Program to implement Dijkstra's Algorithm.
15) Write a Program to Implement Bubble Sort using Recursion.
16) Write a Program to Implement Insertion Sort using Recursion.
17) Write a Program to Implement Selection Sort using Recursion.
18) Write a Program to Implement Linear Search using Recursion.
19) Write a Program to Implement Linear Search using Recursion.
20) Write a Program to Implement Circular Queue.

Subject to Program Outcome Relationship												
Program outcome	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**
Subject mapping			✓			✓		✓		✓		
Unit mapping			**2**			**1**		**1**		2-3		
Category	**UC**	**B/F**			**DC**		**DE**		**UO**		**MNG**	
	HONS	**PROJECT**			**BW**		**PRACTICAL**		**TRAINING**		**SEMINAR**	
							√					
Department	**University Institute of Computing**											
CAP- 206	**DATA STRUCTURES LAB**											

CAP-207	DATABASE MANAGEMENT SYSTEM LAB	L	T	P	C
	Total Contact Hours: 60	-	-	4	2
	Applicable to which branch: BCA.				
	Prerequisite: Basic concept of database.				
Marks					
Internal:60		External:40			

Contents of the Practical

1) How to create the database using commands.
2) Creation of table in the database.
3) Apply the constraints on the table (specify the data type)
4) How to create the indexes.
5) Steps for inserting, deleting, updating the contents of table.
6) Select the data from the database.
7) Perform the command truncate, drop, alter on the table.
8) Restrict the data using Where clause.
9) Use of Logical operator with Where clause.
10) Use of IN, BETWEEN, LIKE, ORDER BY, GROUP BY Use of and HAVING.
11) Use of Aggregate Functions.
12) Combining multiple tables using JOIN.
13) Use of Sub queries.
14) Creation of Views, users, aliases of column.
15) Use of GRANT and REVOKE.

Subject to Program Outcome Relationship												
Program outcome	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**
Subject mapping			✓			✓		✓		✓		
Unit mapping			**2**			**1**		**1**		2-3		
Category	**UC**	**B/F**			**DC**		**DE**		**UO**		**MNG**	
	HONS	**PROJECT**			**BW**		**PRACTICAL**		**TRAINING**		**SEMINAR**	
							√					
Department	**University Institute of Computing**											
CAP- 207	**DATABASE MANAGEMENT SYSTEMS LAB**											

Scheme Version: 2017	**SOCIAL & PROFESSIONAL ETHICS**	**L**	**T**	**P**	**C**
	Applicable To: All programs except engineering, Health, Sciences and law professions.	**0**	**0**	**0**	**0**
UCY-241	Prerequisite: Nil				
	Objectives				
	To Create the awareness regarding Social responsibilities, human behaviour and professional ethics among the graduates of CU				
Subject Outcome					
1	To make them conceptualize the society, inter personal relationship and social behaviour.				
2	To inculcate human values in the graduates in order to make them best human beings				
3	To groom them best professional by making them sensitive to professional responsibilities and ethics				

Unit –I

Social Perspective

Introduction to Society: Concept, Characteristics, Social perceptions, Interpersonal relationships Social behavior, Social etiquettes and social norms.

Personality: Definition, Meaning and nature, Developmental stages of personality

Unit-II

Social & Human Values

Values System: Introduction to values, role of different types of values (individual, societal, material aesthetic, moral and psychological) Value Spectrum for a good life (Self direction, Stimulation, Power, Security, Tradition Universalism) Fundamental rights and Human rights

Cyber Ethics: Accessibility, Censorship and filtering, Digital freedom

Unit-III

Professional Perspective: Concept of Profession and Professionalism, nature and characteristics of profession, Obligations and Professional services.

Professional Ethics: Concept, types: normative, Professional, social, Personal Competence in Professional Ethics

Issues in Professional Ethics: The Current Scenario

Reference Books:

- TripathyA.N,(2003) Human Values, New Age International Publishers

- Jenifer B. Teiford (2008) Social Perception: 21st Century Issues and Challenges, Nova Publishers.
- Subramainam, R, (2013) Professional Ethics, Oxford University Press, New Delhi.
- Mangal. S.K.(2011) Advanced Educational Psychology, Raj Kamal Press, New Delhi
- Fleddermann Charles D. : "Engineering Ethics", Pearson Education/Prentice Hall New Jersey,2004 (Indian Reprint available).
- Naagarazan, RS Professional Ethics and Human: (ISBN : 978-81-224-1938-2)

Subject to Program outcome Relationship												
Program outcome	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**
Subject mapping					√							
Unit mapping												
Category	**UC**		**B/F**		**DC**		**DE**		**UO**		**MNG**	
											√	
	HONS		**PROJECT**		**BW**		**PRACTICAL**		**TRAINING**		**SEMINAR**	
Department			**UNIVERSITY INSTITUTE OF COMPUTING**									
UCY-241	**SOCIAL & PROFESSIONAL ETHICS**											

Scheme Version	GENDER EQUALITY AND WOMEN EMPOWERMENT	L	T	P	C
	Apply to Programs: All the Programs	0	0	0	0
UCY-247	**Prerequisite:** - Nil				
	Objectives				
	"Gender equality is more than a goal in itself. It is a precondition for meeting the challenge of reducing poverty, promoting sustainable development and building good governance." - Kofi Annan The study of Gender aims at preparing the students to face new realities and set new terms for interaction and also about feminity, masculinity, relationships, responsibilities, gender identities etc. An understanding of the gender issues will enable the students to develop good inter-personal skills in the society as well as at the workplace.				
Subject Outcome					
1	*The student will be able to understand and examine gender as a socio-cultural, ideological and discursive construct.*				
2	The students will be sensitized to issues affecting their lives directly.				
3	*Students will be able to understand the importance of equal rights.*				

Unit -I

Understanding Gender

Gender: Definition, Nature, Evolution, Tradition and Culture, Gender Disparity.

Gender Continuum: Factors - Biological, Sociological and Psychological conditioning, Gender based division of labour.

Alternate Gender Identities: Third gender Space and LGBTQ identities.

Unit -II

Contemporary Perspectives

Media and Gender:

Sexual Harassment and Domestic Violence: Eve Teasing, Child Abuse, Workplace Harassment, Homophobia and Transphobia,

Gender Justice and Human Rights.

Masculinity: Contribution of men in women empowerment.

Unit -III

Cross-Cutting Issues

Seminar/Presentation on the following:

Gender Emerging Issues in Education, Poverty, Health, Employment, Policy Making

Strategies for Bridging the gender gap, Women Empowerment Goals (Goal 5 - UNO):

Reference Books:

- Handbook of Gender and Women's Studies edited by Kathy Davis, Mary Evans, Judith Lorber
- An Introduction to Women's Studies: Gender in a Transnational World: Inderpal Grewal, Caren Kaplan, McGraw-Hill Education, 2006
- Introduction to Women's and Gender Studies: An Interdisciplinary Approach, Melissa J. Gillis, Andrew Jacobs, Oxford University Press, 15-Nov-2016

Suggested Reading:

- Jayachandran, Seema (2014) "The Roots of Gender Inequality in Developing Countries", NBER Working Paper No. 20380. Issued in August 2014 http://www.nber.org/papers/w20380
- Levtov et al "Pathways to Gender-equitable Men: Findings from the International Men and Gender Equality Survey in Eight Countries" Men and Masculinities. http://www.promundo.org.br/en/wp-content/uploads/2014/11/Levtov-et-al.pdf
- Deininger, Klaus; Xia, Fang; Jin, Songqing; Nagarajan, Hari K.. 2014. Inheritance law reform, empowerment, and human capital accumulation: second-generation effects from India. Policy Research Working Paper No. WPS 7086. Washington, DC: World Bank Group. http://documents.worldbank.org/curated/en/2014/11/20346331/inheritance-law-reformempowerment-human-capital-accumulation-second-generation-effects-india-inheritance-lawreform-empowerment-human-capital-accumulation-second-generation-effects-india
- Ghani, Ejaz, Mani, Anandi and O'Connell, Stephen D. "Can Political Empowerment Help Economic Empowerment? Women Leaders and Female Labor Force Participation in India." World Bank Policy Research Working Paper 6675, Oct 2013. http://wwwwds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2013/10/23/000158349_20131023113553/ Rendered/PDF/WPS6675.pdf
- Copenhagen Consensus Center. "Gender Equality Targets Benefits and Costs for the Post-2015 Development Agenda." http://www.copenhagenconsensus.com/sites/default/files/gender_equality_one_page.pdf
- *Ellsberg et al 2014, Prevention of violence against women and girls: what does the evidence say www.thelancet.com Published online November 21, 2014 http://dx.doi.org/10.1016/S0140-6736(14)61703-7
- *World Bank 2014, Gender@Work, available at http://www.worldbank.org/content/dam/Worldbank/document/Gender/GenderAtWork_web.pdf

Subject to Program outcome Relationship												
Program outcome	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**
Subject mapping					√							
Unit mapping												
Category	**UC**		**B/F**		**DC**		**DE**		**UO**		**MNG**	
											√	
	HONS		**PROJECT**		**BW**		**PRACTICAL**		**TRAINING**		**SEMINAR**	
Department			**UNIVERSITY INSTITUTE OF COMPUTING**									
UCY-247	**GENDER EQUALITY AND WOMEN EMPOWERMENT**											