

Dr. N.G.P. ARTS AND SCIENCE COLLEGE

(An Autonomous Institution, Affiliated to Bharathiar University, Coimbatore)
 Approved by Government of Tamil Nadu and Accredited by NAAC with 'A++' Grade (3rd Cycle-3.64 CGPA)
 Dr. N.G.P. - Kalapatti Road, Coimbatore-641048, Tamil Nadu, India
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REGULATIONS 2023-24 for Post Graduate Programme (Outcome Based Education model with Choice Based Credit System)

Master of Science in Computer Science with Data Analytics Degree
 (For the students admitted during the academic year 2023-24 and onwards)

Programme: M. Sc. (Computer Science with Data Analytics) Eligibility

Candidates for admission to the first year of the **Master of Science (Computer Science with Data Analytics)** Degree Programme shall be required to have passed in B.Sc. Computer Science / B.C.A. / B.Sc. Computer Technology / B.Sc. Information Technology / B.Sc. Information Sciences / B.Sc. Information Systems / B.Sc. Software Systems / B.Sc. Software Sciences / B.Sc. Applied Sciences (Computer Science / Computer Technology) / B.Sc. Electronics / B.Sc. Mathematics of any University in Tamil Nadu or an Examination accepted as equivalent thereto by the Academic council, subject to conditions as may be prescribed are permitted to appear and qualify for the **Master of Computer Science with Data Analytics Degree Examination** of this College after a programme of study of two academic years.

Programme Educational Objectives

The Curriculum is designed to attain the following learning goals which students shall accomplish by the time of their graduation:

1. Exhibit technical proficiency in Data Analytics to solve real world problems.
2. Engage in successful careers in industry, research and public service.
3. Employ cutting edge tools and technologies for decision making and remain self-motivated and lifelong learners.
4. Practice profession with ethics, integrity, leadership and social responsibility
5. Apply knowledge in areas of Data Analytics for research and entrepreneurship



PROGRAMME OUTCOMES

On the successful completion of the program, the following are the expected outcomes.

PO Number	PO Statement
PO1	Ability to apply knowledge of Computer Science, Mathematics and Statistics to solve problem
PO2	Ability to model, analyze, design, visualize and realize physical systems or processes of increasing size and complexity
PO3	Ability to select appropriate methods and tools for data analysis in specific organizational contexts
PO4	Ability to analyze very large data sets in the context of real world problems and interpret results
PO5	Ability to exhibit soft skills and understand professional and social responsibilities



M.Sc. Computer Science with Data Analytics Credit Distribution


Part	Subjects	No. of Papers	Credit		Semester No.
III	Core	11	3 x 5 = 15 8 x 4 = 32	47	I - III
	Core Practical	06	6 x 2 = 12	12	I - III
	DSE	03	03 x 04 = 12		I - III
	EDC	01	01 x 04 = 04		II
	Industrial Training	01	01 x 02 = 02		III
	Core Project	01	01 x 15 = 15		IV
TOTAL CREDITS			92		




CURRICULUM

M.Sc. COMPUTER SCIENCE WITH DATA ANALYTICS

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
First Semester										
234DA2A1CA	Core I	Principles of Data Science and Python	4	1	-	3	25	75	100	5
234DA2A1CB	Core II	Probability and Statistics	4	1	-	3	25	75	100	4
234DA2A1CC	Core III	Design and Analysis of Algorithms	4	-	-	3	25	75	100	4
234CS2A1CB	Core IV	Advanced Java	4	-	-	3	25	75	100	4
234DA2A1CP	Core Practical I	Python Programming	-	-	4	3	40	60	100	2
234CS2A1CQ	Core Practical II	Advanced Java	-	-	4	3	40	60	100	2
234DA2A1DA	DSE I	Digital Image Processing	4	-	-	3	25	75	100	4
234DA2A1DB		Information Retrieval								
234DA2A1DC		Web Intelligence								
Total			20	2	8	-	-	-	700	25


 9/6/23
BoS Chairman/HoD
 Department of Computer Science with Data Analytics
 Dr. N. G. P. Arts and Science College
 Coimbatore - 641 048

 Dr. N.G.P. Arts and Science College		
APPROVED		
8th	AC - 15th	GB - 20th
9/6/23	14/7/23	5/8/23



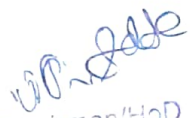
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M.Sc. Computer Science with Data Analytics (Students admitted during the AY 2023-24)

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Second Semester										
234DA2A2CA	Core V	Artificial Intelligence	4	1	-	3	25	75	100	5
234DA2A2CB	Core VI	Advanced Database Management Systems	4	1	-	3	25	75	100	4
234DA2A2CC	Core VII	Information and Network Security	4	-	-	3	25	75	100	4
235IB2A2EA	EDC	Supply Chain Management	4	-	-	3	25	75	100	4
234DA2A2CP	Core Practical III	R for Data Analytics	-	-	4	3	40	60	100	2
234DA2A2CQ	Core Practical IV	Advanced Database Management Systems	-	-	4	3	40	60	100	2
234DA2A2DA	DSE II	Customer Analytics	4	-	-	3	25	75	100	4
234DA2A2DB		Natural Language Processing								
234DA2A2DC		Advanced Statistics								
Total			20	2	8	-	-	-	700	25



Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Third Semester										
234DA2A3CA	Core VIII	Machine Learning	4	1	-	3	25	75	100	5
234DA2A3CB	Core IX	Internet of Things and Applications	4	-	-	3	25	75	100	4
234DA2A3CC	Core X	Cloud Computing	4	-	-	3	25	75	100	4
234DA2A3CD	Core XI	Big Data Analytics	4	1	-	3	25	75	100	4
234DA2A3CP	Core Practical IV	Machine Learning	-	-	4	3	40	60	100	2
234DA2A3CQ	Core Practical V	Big Data Analytics	-	-	4	3	40	60	100	2
234DA2A3DA	DSE III	Data Visualization	4	-	-	3	25	75	100	4
234DA2A3DB		Modern Databases								
234DA2A3DC		Deep Learning								
234DA2A3TA	IT	Industrial Training	-	-	-	3	40	60	100	2
Total			20	2	8	-	-	-	800	27


 DeS. Chairman/HoD
 Department of Computer Science and Data Analytics
 Dr. V. L. P. Srinivas Arts and Science College
 Coimbatore - 641 012

Dr. V. L. P. Srinivas		
APPROVED		
8th	AG - 15th	CB - 20th
9/6/23	14/7/23	5/8/23



Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Fourth Semester										
234DA2A4CV	Core XIII	Project Work	-	-	-	3	80	120	200	15
Total			-	-	-	-	-	-	200	15
*Grand Total									2400	92

*Total Credits does not exceed 92 credits



DISCIPLINE SPECIFIC ELECTIVE

Students shall select the desired course of their choice in the listed elective course during Semesters I, II & III

Semester I (Elective I)

List of Elective Courses

S. No.	Course Code	Name of the Course
1	234DA2A1DA	Digital Image Processing
2	234DA2A1DB	Information Retrieval
3	234DA2A1DC	Web Intelligence

Semester II (Elective II)

List of Elective Courses

S. No.	Course Code	Name of the Course
1	234DA2A2DA	Customer Analytics
2	234DA2A2DB	Natural Language Processing
3	234DA2A2DC	Advanced Statistics

Semester III (Elective III)

List of Elective Courses

S. No.	Course Code	Name of the Course
1	234DA2A3DA	Data Visualization
2	234DA2A3DB	Modern Databases
3	234DA2A3DC	Deep Learning

EXTRA CREDIT COURSES

The following are the courses offered under self study to earn extra credits

Semester III

S. No.	Course Code	Name of the Course
1	234DA2ASSA	Business Analytics
2	234DA2ASSB	Professional Ethics



PG REGULATION (R5)
(2023-24 and onwards)
(OUTCOME BASED EDUCATION WITH CBCS)

Effective from the academic year 2023-24 and applicable to the students admitted to the Degree of Master of Arts/Commerce/Management/Science.

1. NOMENCLATURE

1.1 Faculty: Refers to a group of programmes concerned with a major division of knowledge. Eg. Faculty of Computer Science consists of Programmes like Computer Science, Information Technology, Computer Technology, Computer Applications, Cognitive Systems, Artificial Intelligence and Machine Learning and Cyber Security and Data Analytics etc.

1.2 Programme: Refers to the Master of Arts/Management/Commerce/Science Stream that a student has chosen for study.

1.3 Batch: Refers to the starting and completion year of a programme of study. Eg. Batch of 2023–2025 refers to students belonging to a 2-year Degree programme admitted in 2023 and completing in 2025.

1.4 Course: Refers to component of a programme. A course may be designed to involve lectures / tutorials / laboratory work / seminar / project work/ practical training / report writing / Viva voce, etc or a combination of these, to effectively meet the teaching and learning needs and the credits may be assigned suitably.

a) **Core Courses** A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.

b) **Extra Departmental Course (EDC):** A course chosen generally from a related discipline/subject, with an intention to seek exposure in the discipline relating to the core domain of the student.

c) **Discipline Specific Elective Course (DSE):** Elective courses are offered under main discipline/ subject of study.



d) Internship/Industrial Training (IT)

Students must undertake industrial / institutional training for a minimum of 15 days during the II semester summer vacation. The students will submit the report for evaluation during III semester.

e) **Project Work:** It is considered as a special course involving application of knowledge in problem solving/analyzing/exploring a real-life situation. The Project work will be given in lieu of a Core paper.

f) **Extra credits** Extra credits will be awarded to a student for achievements in co-curricular activities carried out outside the regular class hours. The guidelines for the award of extra credits are given in section two, these credits are not mandatory for completing the programme.

g) **Advanced Learner Course (ALC):** ALC is doing work of a higher standard than usual for students at that stage in their education. Research work / internships carried out in University/ Research Institutions/ Industries of repute in India or abroad for a period of 15 to 30 days.

2. STRUCTURE OF PROGRAMME

- Core Course
- Extra Departmental Course (EDC)
- Discipline Specific Elective (DSE)
- Industrial Training (IT)
- Project

3. DURATION OF THE PROGRAMME

M.Sc. /M.Com. / M.A. Programme must be completed within 2 Years (4 semesters) and maximum of 4 Years (8 semesters) from the date of acceptance to the programme. If not, the candidate must enroll in the course determined to be an equivalent by BoS in the most recent curriculum recommended for the Programme.

4. REQUIREMENTS FOR COMPLETION OF A SEMESTER

Every student shall ordinarily be allowed to keep terms for the given semester in a program of his/ her enrolment, only if he/ she fulfills at least seventy five percent (75%) of the attendance taken as an average of the total number of lectures,



practicals, tutorials, etc. wherein short and/or long excursions/field visits/study tours organised by the college and supervised by the faculty as envisaged in the syllabus shall be credited to his attendance. Every student shall have a minimum of 75% as an overall attendance.

5. EXAMINATIONS

The end semester examinations shall normally be conducted after completing 90 working days for each semester. The maximum marks for each theory and practical course as follows,

Mark distribution for Theory Courses

Continuous Internal Assessment (CIA) :	40 Marks
End Semester Exams (ESE) :	60 Marks
Total :	100 Marks

i) Distribution of Internal Marks

S.No.	Particulars	Distribution of Marks
1	CIA I (2.5 Units) (On completion of 45 th working day)	5
2	Model (All 5 Units) (On completion of 85 th working day)	5
3	Attendance	05
4	Library Usage	05
5	Skill Enhancement *	05
Total		25

Breakup for Attendance Marks:

S.No	Attendance Range	Marks Awarded
1	95% and Above	5
2	90% - 94%	4
3	85% - 89%	3
4	80% - 84%	2
5	75% - 79%	1

Note:

Special Cases such as NCC, NSS, Sports, Advanced Learner Course, Summer Fellowship and Medical Conditions etc. the attendance exemption may be given by principal and Mark may be awarded.



Break up for Library Marks:

S.No	Attendance Range	Marks Awarded
1	10h and above	5
2	9h- less than 10h	4
3	8h - less than 9h	3
4	7h - less than 8h	2
5	6h - less than 7h	1

Note:

In exception, the utilization of e-resources of library will be considered.

*Components for "Skill Enhancement" may include the following:

Class Participation, Case Studies Presentation/Term paper, Field Study, Field Survey, Group Discussion, Term Paper, Presentation of Papers in Conferences, Industry Visit, Book Review, Journal Review, e-content Creation, Model Preparation, Seminar and Assignment.

Components for Skill Enhancement

Any one of the following should be selected by the course coordinator

S.No.	Skill Enhancement	Description
1	Class Participation	<ul style="list-style-type: none"> • Engagement in class • Listening Skills • Behaviour
2	Case Study Presentation/ Term Paper	<ul style="list-style-type: none"> • Identification of the problem • Case Analysis • Effective Solution using creativity/ imagination
3	Field Study	<ul style="list-style-type: none"> • Selection of Topic • Demonstration of Topic • Analysis & Conclusion
4	Field Survey	<ul style="list-style-type: none"> • Chosen Problem • Design and quality of survey • Analysis of survey
5	Group Discussion	<ul style="list-style-type: none"> • Communication skills • Subject knowledge • Attitude and way of presentation • Confidence • Listening Skill
6	Presentation of Papers in Conferences	<ul style="list-style-type: none"> • Sponsored • International/National • Presentation • Report Submission



7	Industry Visit	<ul style="list-style-type: none"> • Chosen Domain • Quality of the work • Analysis of the Report • Presentation
8	Book Review	<ul style="list-style-type: none"> • Content • Interpretation and Inferences of the text • Supporting Details • Presentation
9	Journal Review	<ul style="list-style-type: none"> • Analytical Thinking • Interpretation and Inferences • Exploring the perception if chosen genre • Presentation
10	e-content Creation	<ul style="list-style-type: none"> • Logo/ Tagline • Purpose • Content (Writing, designing and posting in Social Media) • Presentation
11	Model Preparation	<ul style="list-style-type: none"> • Theme/ Topic • Depth of background Knowledge • Creativity • Presentation
12	Seminar	<ul style="list-style-type: none"> • Knowledge and Content • Organization • Understanding • Presentation
13	Assignment	<ul style="list-style-type: none"> • Content and Style • Spelling and Grammar • References

ii) Distribution of External Marks

Total	:	75
Written Exam	:	75

Marks Distribution for Practical course

Total	:	100
Internal	:	40
External	:	60



i) Distribution of Internals Marks

S. No.	Particulars	Distribution of Marks
1	Experiments/Exercises	15
2	Test 1	10
3	Test 2	10
4	Observation Notebook	05
Total		40

ii) Distribution of Externals Marks

S.No.	Particulars	External Marks
1	Practical	40
2	Record	10
3	Viva- voce	10
Total		60

Practical examination shall be evaluated jointly by Internal and External Examiners.

A) Mark Distribution for Project

Total	:	200
Internal	:	80
External	:	120

i) Distribution of Internal Marks

S.No.	Particulars	Internal Marks
1	Review I	30
2	Review II	40
3	Attendance	10
Total		80

ii) Distribution of External Marks

S.No	Particulars	External Marks
1	Project Work & Presentation	100
2	Viva -voce	20
Total		120

Evaluation of Project Work shall be done jointly by Internal and External Examiners.



6 . Credit Transfer

- a. Upon successful completion of 1 NPTEL Course (4 Credit Course) recommended by the department, during Semester I to II, a student shall be eligible to get exemption of one 4 credit course during the 3rd semester. The proposed NPTEL course should cover content/syllabus of exempted core paper in 3rd semester.

S. No.	Course Code	Course Name	Proposed NPTEL Course	Credit
1			Option - 1 Paper title	4
			Option - 2 Paper title	
			Option - 3 Paper title	

- b. Upon successful completion of 2 NPTEL Courses (2 Credit each) recommended by the department, during Semester I to II, a student shall be eligible to get exemption of one 4 credit course during the 3rd semester. Out of 2 NPTEL proposed courses, at least 1 course should cover content/syllabus of exempted core paper in 3rd semester.

Mandatory

The exempted core paper in the 3rd semester should be submitted by the students for approval before the end of 2nd semester

Credit transfer will be decided by equivalence committee

S. No.	Course Code	Course Name	Proposed NPTEL Course	Credit
1			Option - 1 Paper title	2
			Option - 2 Paper title	
			Option - 3 Paper title	
2			Option - 1 Paper title	2
			Option - 2 Paper title	
			Option - 3 Paper title	



NPTEL Courses to be carried out during semester I - II.					
S. No.	Student Name	Class	Proposed NPTEL Course		Proposed Course for Exemption
			Course I	Option 1- Paper Title Option 2- Paper Title Option 3- Paper Title	Any one Core Paper in 3 rd Semester
			Course II	Option 1- Paper Title Option 2- Paper Title Option 3- Paper Title	
Class Advisor		HoD		Dean	

Mark Distribution for Internship/ Industrial Training

Total	:	100
Internal	:	40
External	:	60

i) Distribution of Internal Marks

S.No.	Particulars	Internal Marks
1	Review I	15
2	Review II	20
3	Attendance	5
Total		40

ii) Distribution of External Marks

S.No	Particulars	External Marks
1	Internship /Industrial training Presentation	40
2	Viva -voce	20
Total		60

Internship/ Industrial training shall be evaluated jointly by Internal and External Examiners.



9. Extra Credits: 10

Earning extra credit is not essential for programme completion. Student is entitled to earn extra credit for achievement in Curricular/Co-Curricular/ Extracurricular activities carried out other than the regular class hours.

A student is permitted to earn a maximum of 10 extra Credits during the programme period.

A maximum of 1 credit under each category is permissible.

Category	Credit
Self study Course	1
CA/ICSI/CMA (Foundations)	1
CA/ICSI/CMA (Inter)	1
Sports and Games	1
Publications / Conference Presentations (Oral/Poster)/Awards	1
Innovation / Incubation / Patent / Sponsored Projects / Consultancy	1
Representation in State / National level celebrations	1
Awards/Recognitions/Fellowships	1
Advanced Learner Course (ALC)*	2

Credit shall be awarded for achievements of the student during the period of study only.

GUIDELINES

Self study Course

A pass in the self study courses offered by the department.

The candidate should register the self study course offered by the department only in the III semester.

CA/ICSI/CMA(Foundations)

Qualifying foundation in CA/ICSI/CMA / etc.

CA/ICSI/CMA(Inter)

Qualifying Inter in CA/ICSI/CMA / etc.

Sports and Games

The Student can earn extra credit based on their Achievement in sports in University/ State / National/ International.



Publications / Conference Presentations (Oral/Poster)

Research Publications in Journals

Oral/Poster presentation in Conference

Innovation / Incubation / Patent / Sponsored Projects / Consultancy

Development of model/ Products /Prototype /Process/App/Registration of Patents/ Copyrights/Trademarks/Sponsored Projects /Consultancy

Representation in State/National level celebrations

State / National level celebrations such as Independence day, Republic day Parade, National Integration camp etc.

Awards/Recognitions/Fellowships

Regional/ State / National level awards/ Recognitions/Fellowships

*Advanced Learner Course (ALC):

ALC is doing work of a higher standard than usual for students at that stage in their education.

Research work/internships carried out in University/ Research Institutions/ Industries of repute in India or abroad for a period of 15 to 30 days will be considered as Advanced Learners Course.

QUESTION PAPER PATTERN

CIA Test I : [1^{1/2} Hours-2.5 Units] - 25 Marks

SECTION	MARKS	DESCRIPTION	TOTAL	Remarks
Section - A	8 x 0.5= 04 Marks	MCQ	25 Marks	Marks secured will be converted To 5 mark
Section - B	3 x 2 = 06 Marks	Answer ALL Questions Either or Type ALL Questions Carry Equal Marks		
Section - C	3 x 05 = 15 Marks			



CIA Test II/ Model [3 Hours-5 Units] - 75 Marks

SECTION	MARKS	DESCRIPTION	TOTAL	Remarks
Section - A	10 x 1 = 10 Marks	MCQ		
Section - B	5 x 3 = 15 Marks	Answer ALL Questions (Either or Type Questions) Each Questions Carry Equal Marks	75 Marks	Marks secured will be converted To 5 mark
Section - C	5 x 8 = 40 Marks			
Section - D	1 x 10 = 10 Marks	Compulsory Question		

End Semester Examination [3 Hours-5 Units] - 75 Marks

SECTION	MARKS	DESCRIPTION	TOTAL
Section - A	10 x 1 = 10 Marks	MCQ	
Section - B	5 x 3 = 15 Marks	Answer ALL Questions (Either or Type Questions) Each Questions Carry Equal Marks	75 Marks
Section - C	5 x 8 = 40 Marks		
Section - D	1 x 10 = 10 Marks	Compulsory Question	



Course Code	Course Name	Category	L	T	P	Credit
234DA2A1CA	Principles of Data Science and Python	CORE	4	1	-	5

PREAMBLE

This course has been designed for students to learn and understand

- Concepts of Data Science
- Understand about Python Programming
- Plotting and Visualization in Python

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the principles of data science	K2
CO2	Understand the techniques for Data Handling	K2
CO3	Apply Numpy and Pandas to perform numerical operations	K3
CO4	Apply the concepts of Python for Data Aggregation and Wrangling	K3
CO5	Create the visualization concepts in Python	K6

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	
CO2	✓	✓	✓	✓	
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓

<input checked="" type="checkbox"/>	Skill Development	<input type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input type="checkbox"/>	Innovations
<input type="checkbox"/>	Intellectual Property Rights	<input type="checkbox"/>	Gender Sensitization
<input type="checkbox"/>	Social Awareness/ Environment	<input type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



234DA2A1CA	PRINCIPLES OF DATA SCIENCE AND PYTHON	SEMESTER I
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Total Credits: 5

Total Instruction Hours: 60 h

Syllabus

Unit I Data science 12 h

Introduction: Benefits of Data Science - Facets of Data - Big data eco system and data science - Data science process: Steps in data science process - Retrieving data - Data preparation - Data exploration - Data modeling - Presentation - Case Study

Unit II Handling Large Data 12 h

Problems when handling large data - General techniques for handling large data - General techniques for handling large volumes of data - General Programming dealing with Large Data Sets - Steps in big data - Distributing data storage and processing with Frameworks - Applications in Data Science - Case Study - Assessing risk when loaning money

Unit III Numpy and Pandas 12 h

Introduction to NumPy - Understanding the N - dimensional data structure - Creating NumPy arrays - Basic operations and manipulations on N-dimensional arrays - Indexing and Slicing - Advanced Indexing - Pandas: Mathematical Functions - Statistical Functions - Search, Sorting and Counting Functions - Matrix Library

Unit IV Data Aggregation and Operations 12 h

Introduction: GroupBy Mechanics - Data Aggregation - Groupwise Operations and Transformations - Pivot Tables and Cross Tabulations - Date and Time Date - Type tools - Time Series Basics - Data Ranges - Frequencies and Shifting Combining and Merging DataSets - Reshaping and Pivoting - Data Transformation - String Manipulation, Regular Expressions

Unit V Plotting and Visualization 12 h

Introduction: Data Acquisition by Scraping web applications - Submitting a form - Fetching web pages - CSS Selectors. Visualization: Visualization In Python: Matplotlib package - Plotting Graphs - Controlling Graph - Adding Text - More Graph Types - Getting and setting values - Plotting with Pandas and seaborn - Line plots - Bar Plots - Histogram Density and Plots - scatter or point plots - facet grids and categorical data



Text Books

- 1 Davy Cielen, Arno D.B. Meysmen, Mohamed Ali, 2020, "Introducing Data Science", Dream Tech Press (UNITS I,II)
- 2 Wes Mc Kinney, 2020, "Python for Data Analysis", 5th Edition, O'Reilly (UNITS III, IV, V)

References

- 1 John V Guttag, 2016, "Introduction to Computation and Programming Using Python", 2nd Edition., MIT press]
- 2 Gypsy Nandi, Rupam Kumar Sharma, 2020, "Data Science Fundamentals and Practical Approach, BPB
- 3 Zed Shaw, 2014, "Learn Python the Hard Way", 3rd Edition, Addison-Wesley, USA,
- 4 Fabio Nelli, 2018, "Python Data Analytics", Second Edition, Apress, New York,



Course Code	Course Name	Category	L	T	P	Credit
234DA2A1CB	PROBABILITY AND STATISTICS	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Data numerically and visually
- The knowledge of testing of hypothesis for small and large samples which plays an important role in real life applications
- Data-based claims and quantitative arguments

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Make use of the concepts of probability which can describe real life phenomenon	K2
CO2	Apply discrete and continuous probability distributions in the relevant application areas	K3
CO3	Learn how to develop correlation and regression model and apply for the specific perspective data in appropriate manner	K3
CO4	Analyse a best estimator with reference to the different criteria in case of real-life applications	K4
CO5	Learn the details and complexities of Analysis of Variance (ANOVA)	K4

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓				
CO2	✓		✓	✓	
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓

<input checked="" type="checkbox"/>	Skill Development	<input checked="" type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input type="checkbox"/>	Innovations
<input type="checkbox"/>	Intellectual Property Rights	<input type="checkbox"/>	Gender Sensitization
<input type="checkbox"/>	Social Awareness/ Environment	<input type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



Dr.NGPASC

COIMBATORE | INDIA

M.Sc. Computer Science with Data Analytics (Students admitted during the AY 2023-24)

234DA2A1CB	PROBABILITY AND STATISTICS	SEMESTER I
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Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Probability Concepts 10 h

Introduction -Probability Defined -Importance of the Concept of Probability - Calculation of Probability -Theorems of Probability -Addition Theorem - Multiplication Theorem -Conditional Probability -Bayes' Theorem -Mathematical Expectation

Unit II Probability Distributions 10 h

Introduction - Binomial Distribution-Fitting a Binomial Distribution- Poisson Distribution - Fitting a Poisson Distribution- Normal Distributions - Fitting a Normal Curve

Unit III Correlation and Regression Analysis 12 h

Correlation- Scatter Diagram Method -Graphic Method- Karl Pearson's Coefficient of Correlation-Spearman's coefficient of Correlation - Regression Analysis - Regression Lines -Regression Equations -Regression Equation of Y on X -Regression Equation of X on Y

Unit IV Statistical Inference -Testing of Hypothesis 14 h

Introduction - Hypothesis Testing - Standard Error and Sampling Distribution - Estimation -Tests of Significance for Large Samples -Difference between small and large samples -Two tailed test for difference between the means of two samples - Standard Error of the difference between two standard deviations -Tests of significance for small samples - Assumption of Normality -Student's t distribution - Application of the t Distribution

Unit V Chi square test, F-test and Analysis of Variance 14 h

Introduction- Chi-Square test- F-Test -Applications of F-Test -Analysis of Variance - Assumptions -Technique of Analysis of Variance - One-Way Classification - Analysis of Variance in Two-Way Classification Model



Text Books

- 1 Gupta S.P, 2017, "Statistical Methods", 45th Edition, Sultan Chand and Sons, New Delhi

References

- 1 Ronald E. Walpole, 2018, "Probability and Statistics", 9th Edition, Pearson Education, South Asi
- 2 Sheldon M. Ross, 2017, "Introductory Statistics", 4th Edition, Academic Press, United States
- 3 Vijay K. Rohatgi A.K, MD. Ehsanes Saleh, 2015, " An introduction to Probability and Statistics", 3rd Edition, John Wiley and Sons, New Delhi
- 4 Sheldon M. Ross, 2017, "A first course in Probability", 5th Edition, PHI, New Jersey



Course Code	Course Name	Category	L	T	P	Credit
234DA2A1CC	DESIGN AND ANALYSIS OF ALGORITHMS	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Design and analysis of algorithm techniques
- Analyze the efficiency of different algorithmic solutions
- Implementation and evaluation of complex algorithms

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamentals of algorithms and data structures	K2
CO2	Apply Divide and Conquer approach using various sorting algorithms	K3
CO3	Analyze Greedy algorithm design technique and its applications	K4
CO4	Interpret Dynamic Programming paradigms to solve real-world problems	K2
CO5	Implement Backtracking, Branch and Bound techniques to solve complex problems	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓		
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓		
CO4	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓

<input checked="" type="checkbox"/>	Skill Development	<input type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input type="checkbox"/>	Innovations
<input type="checkbox"/>	Intellectual Property Rights	<input type="checkbox"/>	Gender Sensitization
<input type="checkbox"/>	Social Awareness/ Environment	<input type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



234DA2A1CC	DESIGN AND ANALYSIS OF ALGORITHMS	SEMESTER I
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction 8 h

Algorithm Definition - Analyzing and Designing algorithms - Performance Analysis-Asymptotic Notations - Time and Space complexity of an algorithm using O Notation. Elementary Data Structures: Stacks and Queues - Linked lists.

Unit II Divide and Conquer 10 h

Introduction: Strassen's Algorithm for Matrix Multiplication - Sorting and Order Statistics: Heap sort - Algorithm - Priority Queues - Quick Sort - Description, Performance and Analysis - Merge sort.

Unit III The Greedy Method 10 h

The General Method - Knapsack Problem - Minimum Cost Spanning Trees - Prim's Algorithm - Kruskal's Algorithm - Optimal Storage On Tapes - Optimal Merge Patterns - Single Source Shortest Paths - Dijkstra's Algorithm.

Unit IV Dynamic Programming 10 h

The General Method - All-Pairs Shortest Paths - Warshall's and Floyd's Algorithm - Single-Source Shortest Paths - Bellman-Ford Algorithm - Optimal Binary Search Trees - 0/1 Knapsack - Reliability Design - The Traveling Salesperson Problem.

Unit V Backtracking 10 h

The General Method - The 8-Queens Problem - Sum of Subsets - Graph Coloring - Hamiltonian Cycles - Branch and Bound: Knapsack Problem - Travelling Salesman Problem.



Text Books

- 1 Thomas H. Cormen, Charles E. Leiserson and Ronald L. Rivest, 2009, "Introduction to Algorithms", 3rd Edition, MIT Press
- 2 Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, 2009, "Fundamentals of Computer Algorithms, 2nd Edition, University Press

References

- 1 Robert L. Kruse and Clovis L. Tondo, 2007, "Data Structures and Program design in C", 2nd Edition, Pearson Education
- 2 Michael T. Goodrich, Roberto Tamassia", 2001, "Algorithm Design, Foundations, Analysis, and Internet Examples", 1st Edition., Wiley
- 3 Mark Allen Weiss, 2013, "Introduction to the Design Data Structures and Algorithm Analysis in C++", 4th Edition., Addison-Wesley
- 4 Tim Roughgarden. 2017, "Algorithms Illuminated", Kindle Edition Soundlikeyourself Publishing, New York.



Course Code	Course Name	Category	L	T	P	Credit
234CS2A1CB	ADVANCED JAVA	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Advance Java concepts to develop applications
- The Concepts of Java Beans and Swings
- Database Connectivity using JDBC and Embedded SQL

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand about Java beans and swing	K2
CO2	Understand the life cycle of Java Servlet	K2
CO3	Develop and apply event in JSP and RMI	K3
CO4	Learn the architecture and design of Enterprise Java Bean	K2
CO5	Design applications implementing Database Connectivity using JDBC and Embedded SQL.	K6

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓		
CO2	✓	✓	✓		
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓		
CO5	✓	✓	✓	✓	✓

<input checked="" type="checkbox"/>	Skill Development	<input type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input type="checkbox"/>	Innovations
<input type="checkbox"/>	Intellectual Property Rights	<input type="checkbox"/>	Gender Sensitization
<input type="checkbox"/>	Social Awareness/ Environment	<input type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



234CS2A1CB	ADVANCED JAVA	SEMESTER I
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Java Beans and Swings 10 h

Introduction: Advantages - Design patterns for Properties - Events - Methods and Design Patterns - Java Beans API - Swing : Introduction - Swing Is Built on the AWT - Two Key features of Swing - MVC Connections - Components and Containers - The Swing Packages - Simple Swing Applications - Exploring Swing

Unit II Java Servlet 10 h

Introduction: Background - The life cycle of a Servlet - Using Tomcat for Servlet development - A Simple Servlet - The Javax.Servlet Packages - Reading Servlet Parameters - The javax.servlet.http packages - Handling Http request and responses - cookies - Session Tracking

Unit III Java Server Pages, Remote Method Invocation 8 h

Java Server Pages- Introduction - Tags: Variable Objects - Request String: Parsing Other Information - User Session - Cookies - Session objects. Java Remote method Invocation: Remote Interface - Passing Objects - RMI Process - Server side - Client side

Unit IV Enterprise Java Bean 10 h

Enterprise Java Beans : The EJB Container - EJB Classes - EJB Interfaces - Deployment Descriptors : Referencing EJB - Sharing Resources - Security Elements - Query Elements - Assembly Elements - Session Java Bean: Stateless and Stateful - Creating a Session Java Bean - Entity Java Bean - Message -Driven Bean

Unit V Database Connectivity 10 h

JDBC Objects : The Concept of JDBC - JDBC Driver types - JDBC Packages - Database Connection - Statement Objects - ResultSet - Transaction Processing - JDBC and Embedded SQL : Tables and Indexing - Inserting, Selecting and Updating Data



Text Books

- 1 Herbert Schildt, 2018, "Java The Complete Reference", 10th Edition, Tata McGraw Hill (Unit I-II)
- 2 Jim Keogh, 2002, "J2EE: The Complete Reference", McGraw Hill Education (Unit III - V)

References

- 1 Herbert Schildt, 2018, "Java, A Beginner Guide", 8th Edn., Oracle Press
- 2 Bert Bates, KarthySierra, Eric Freeman, Elisabeth Robson, 2009, "Head First Design Patterns", 1st Edition., O'Reilly
- 3 Robert Pattinson, 2018, "The Ultimate Beginners Guide for Advance Java" First Edition, Amazon Digital Services LLC
- 4 E RamarajP Geetha S Muthukumaran, 2018, "Advanced JAVA Programming", 1st Edition, Pearson.,Noida.



234DA2A1CP	PYTHON PROGRAMMING	SEMESTER I
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Total Credits: 2
Total Instructions Hours: 48 h

S.No	List of Programs
1	Programs to perform aggregation operations
2	Programs to Implement a sequential search
3	Programs to Explore string functions
4	Programs to Read and Write into a file
5	Programs to Demonstrate use of List
6	Programs to Demonstrate use of Dictionaries
7	Programs to Demonstrate use of Tuples
8	Programs to Create Comma Separate Files (CSV), Load CSV files into internal Data
9	Programs using Pandas: Extract items at given positions from a series
10	Programs to implement correlation and covariance
11	Program to plot graphs using Matplotlib and seaborn packages
12	Programs to Perform Analysis for given data set using Pandas

Note: Ten Programs are mandatory



234CS2A1CQ	ADVANCED JAVA	SEMESTER I
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Total Credits: 2
Total Instructions Hours: 48h

S.No	List of Programs
1	Programs using Java control statements.
2	Programs to implement the Collection with Iterator.
3	Programs to create applet incorporating features such as images, shapes, background, and foreground color
4	Create applications using simple GUI
5	Programs to perform some applications using Java Bean
6	Create applications using Swing
7	Programs to demonstrate AWT Components with Event Handling.
8	Programs to perform Session Tracking.
9	Java servlet programs to implement sendredirect () Method (using Http servlet class).
10	Servlet programs using HTTP Servlet.
11	Create web applications using JSP.
12	Programs with JDBC to interact with database.

Note:Ten Programs are mandatory.



Course Code	Course Name	Category	L	T	P	Credit
234DA2A1DA	DIGITAL IMAGE PROCESSING	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Digital image processing fundamentals, color models and image filtering
- Image edge detection and image compression concepts and implement them
- Image segmentation and morphological concepts and implement them

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand image processing fundamentals, its models and color models	K2
CO2	Discuss images filtering concepts and techniques	K2
CO3	Demonstrate image edge detection techniques and applications	K3
CO4	Apply image compression methods and models for real life problems	K3
CO5	Analyze segmentation and morphological image processing	K4

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓		
CO2	✓	✓	✓		
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓

<input checked="" type="checkbox"/>	Skill Development	<input type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input type="checkbox"/>	Innovations
<input type="checkbox"/>	Intellectual Property Rights	<input type="checkbox"/>	Gender Sensitization
<input type="checkbox"/>	Social Awareness/ Environment	<input type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



234DA2A1DA	DIGITAL IMAGE PROCESSING	SEMESTER I
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Fundamentals and Color Models 8 h

Fundamentals: Image Sensing and Acquisition - Image Sampling and Quantization - relationship between Pixels - Random noise - Gaussian Markov Random Field - σ -field, Linear and Non-linear Operations - Image processing models: Causal - Semi-causal - non-causal models - Color Models: Color Fundamentals - Color Models - Pseudo-color Image Processing - Full Color Image Processing - Color Transformation - Noise in Color Images.

Unit II Spatial Domain and Frequency Domain 10 h

Spatial Domain: Enhancement in spatial domain: Point processing - Mask processing - Smoothing Spatial Filters - Sharpening Spatial Filters - Combining Spatial Enhancement Methods - Frequency Domain: Image transforms: FFT - DCT - Karhunen-Loeve transform - Hotlling's T square transform - Wavelet transforms and their properties - Image filtering in frequency domain.

Unit III Edge Detection 10 h

Edge Detection: Types of edges - threshold - zero-crossing - Gradient operators: Roberts - Prewitt - and Sobel operators - residual analysis-based technique - Canny edge detection - Edge features and their applications.

Unit IV Image Compression 10 h

Image Compression: Fundamentals - Image Compression Models - Elements of Information Theory - Error Free Compression: Huff-man coding - Arithmetic coding; - Wavelet transform based coding - Lossy Compression: FFT - DCT - KLT - DPCM - MRFM based compression - Wavelet transform based - Image Compression standards.

Unit V Image Segmentation 10 h

Image Segmentation: Detection and Discontinuities: Edge Linking and Boundary Deduction - Threshold - Region-Based Segmentation - Segmentation by Morphological watersheds - The use of motion in segmentation - Image Segmentation based on Color - Case study.



Morphological Image Processing: Erosion and Dilation, Opening and Closing, Hit-Or-Miss Transformation, Basic Morphological Algorithms, Gray-Scale Morphology

Text Books

- 1 Rafael Gonzalez, Richard E. Woods, 2019, "Digital Image Processing", (Fourth Edition), Pearson Education (UNIT I, II,IV,V)
- 2 A. K. Jain, 2015, "Fundamentals of Image Processing", Second Edition, Pearson Education (UNIT III)

References

- 1 S Annadurai, R Shanmugalakshmi, 2007, " Fundamentals of Digital Image Processing, (First Edition), Pearson Education
- 2 Todd R.Reed,2015, "Digital Image Sequence Processing, Compression and Analysis", (Sixth Edition), ECRC Press
- 3 Prasad, S.S.Iyengar, 2015 "Wavelet Analysis with Applications to Image Processing", (Seventh Edition) CRC Press
- 4 William K. Pratt, 2002, "Digital Image Processing", John Wiley, New York,.



Course Code	Course Name	Category	L	T	P	Credit
234DA2A1DB	INFORMATION RETRIEVAL	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The concepts of information retrieval techniques
- The techniques focused on document classification, tolerant retrieval and evaluation
- The methods of developing an information retrieval system

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the concepts of the standard models of Information Retrieval	K2
CO2	Understand the methods for handling wild card queries and spelling correction	K2
CO3	Apply appropriate methods for scoring and evaluating IR systems	K3
CO4	Apply text classification to locate relevant information from large collections of text data	K3
CO5	Design an Information Retrieval System for search tasks involving XML and web data	K6

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	
CO2	✓	✓	✓	✓	
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓

<input checked="" type="checkbox"/>	Skill Development	<input type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input type="checkbox"/>	Innovations
<input type="checkbox"/>	Intellectual Property Rights	<input type="checkbox"/>	Gender Sensitization
<input type="checkbox"/>	Social Awareness/ Environment	<input type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



Dr.NGPASC

COIMBATORE | INDIA

M.Sc. Computer Science with Data Analytics (Students admitted during the AY 2023-24)

234DA2A1DB	INFORMATION RETRIEVAL	SEMESTER I
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction to Information Retrieval 9 h

Introduction to Information Retrieval- Building an inverted Index - Processing Boolean Queries - Boolean Model vs Ranked Retrieval - Term Vocabulary and Postings: Tokenization - Stop words - Normalization-Stemming - Skip pointers - Phrase queries: Biword indexes- Positional indexes

Unit II Tolerant Retrieval, Index construction 10 h

Search Structures for Dictionaries- Wild card queries - General wild card queries- kgram indexes for wild card queries - Spelling correction - Forms- Edit distance - kgram indexes for spelling correction - Phonetic Correction - Index construction- Distributed indexing- Statistical properties of terms : Heaps' Law- Zipf's Law

Unit III Evaluation in Information Retrieval 10 h

Term frequency and weighting -Inverse document frequency- TF-IDF weighting - Vector space model for scoring -Efficient scoring and ranking -Evaluation: Information retrieval system evaluation- Evaluation of unranked retrieval sets- Evaluation of ranked retrieval sets- Case study

Unit IV Text Classification 10 h

Text classification and Naive Bayes- The text classification problem- Naive Bayes text classification - Feature selection - Mutual information- Vector space classification: Document representations and measures of relatedness in vector spaces- k nearest neighbour - Linear versus nonlinear classifiers - Case study

Unit V XML Retrieval and Web search 9 h

XML Indexing and Search: Basic XML concepts - Challenges in XML retrieval- A vector space model for XML retrieval - Data vs. Text-centric XML- Web search basics- Web characteristics-Web crawling - Features of web crawler-Architecture- Distributing indexes indexes - Machine learning methods in ad hoc information retrieval - Case study



Text Books

- 1 Christopher D. Manning, Prabhakar Raghavan, and Hinrich Schuetze, 2009 ,
"Introduction to Information Retrieval", Edition, Cambridge University Press

References

- 1 Baeza -Yates Ricardo and Berthier Ribeiro - Neto, 2011, "Modern Information Retrieval",. 2nd edition, Addison-Wesley
- 2 Gerald Kowalski, 2010, "Information Retrieval Architecture and Algorithms", First Edition, Berlin, Heidelberg: Springer-Verlag
- 3 G.G. Chowdhury, 2010, "Introduction to Modern Information Retrieval", 3rd Edition, Facet Publishing
- 4 Bruce Croft, Donald Metzler, and Trevor Strohman, , 2009, "Search Engines: Information Retrieval in Practice" Pearson Education



Course Code	Course Name	Category	L	T	P	Credit
234DA2A1DC	WEB INTELLIGENCE	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The concepts of web mining and crawling
- The techniques in opinion mining and sentiment analysis
- The concepts of social network Analysis

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the concepts of web mining	K2
CO2	Analyze social networks and web crawling	K4
CO3	Experiment with opinion mining and sentiment analysis	K5
CO4	Understand Google Analytics	K2
CO5	Design Applications using web intelligence	K5

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓		
CO2	✓	✓	✓	✓	
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓

<input checked="" type="checkbox"/>	Skill Development	<input type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input type="checkbox"/>	Innovations
<input type="checkbox"/>	Intellectual Property Rights	<input type="checkbox"/>	Gender Sensitization
<input type="checkbox"/>	Social Awareness/ Environment	<input type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



234DA2A1DC	WEB INTELLIGENCE	SEMESTER I
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Fundamentals of Web Mining 10 h

Introduction - Web Mining: Information Retrieval and Web Search - Basic Concepts of Information Retrieval - Information Retrieval Models - Relevance Feedback - Evaluation Measures - Text and Web Page Pre-Processing - Web Search - Meta Search: Combining Multiple Rankings - Web Spamming

Unit II Social Network Analysis and Web Crawling 10 h

Social Network Analysis - Co-Citation and Bibliographic Coupling - Page Rank - Semantic web - Web Intelligence: Levels - Goals - Characteristics - Challenges and issues Tools for web crawling - Web Crawling: Basic Crawler Algorithm - Implementation Issues - Universal Crawlers - Focused Crawlers - Topical Crawlers: Topical Locality and Cues - Best-First Variations - Adaptation - Evaluation - Crawler Ethics and Conflicts

Unit III Opinion Mining and Sentiment Analysis 8 h

The Problem of Opinion Mining - Document Sentiment Classification - Sentence Subjectivity and Sentiment Classification - Opinion Lexicon Expansion - Aspect-Based Opinion Mining - Mining Comparative Opinions - Opinion Search and Retrieval - Case study

Unit IV Google Analytics 10 h

Google Analytics: Introduction - Cookies - Accounts vs Property - Tracking Code - Tracking Unique Visitors - Demographics - Page Views and Bounce Rate Acquisitions - Custom Reporting - Case study

Unit V Applications 10 h

Applications: Filters - Ecommerce Tracking - Real Time Reports - Customer Data-Alert - Adwords Linking - Adsense Linking - Attribution Modeling - Segmentation - Campaign Tracking - Multi-Channel Attribution - Case Study - Recommendation engines based on users, items and contents



Text Books


- 1 Bing Liu ,2011, "Web Data Mining Exploring Hyperlinks, Contents, and Usage Data", 2nd Edition, Springer(Unit I-III)
- 2 Ning Zhong , Jiming Liu and Yiyu Yao, 2010, "Web Intelligence", Springer(Unit IV,V)

References

- 1 Ricardo Baeza -Yates and BerthierRibeiro-Neto,2011,"Information Retrieval: The Concepts and Technology behind Search,2nd Edition, ACM Press
- 2 Juan D. Velasquez, Lakhmi C. Jain (Eds.),2010,"Advanced Techniques in Web Intelligence - 1",1st Edition, Springer
- 3 Mark Levene,2010,"An Introduction to Search Engines and Web Navigation",2nd Edition, Wiley
- 4 Eric Fettman, Shiraz Asif, Feras Alhlou , 2016 "Google Analytics Breakthrough", Wiley

N. G. P. Arts and Science College
9/16/23

BoS Chairman/HoD
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 Dr. N. G. P. Arts and Science College		
APPROVED		
BoS - 8th 9/16/23	AC - 15th 14/7/23	GB - 20th 5/8/23

