

**NOIDA INSTITUTE OF ENGG. & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR
(AN AUTONOMOUS INSTITUTE)**



Affiliated to

DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW



Evaluation Scheme & Syllabus

**For
Bachelor of Technology**

Fourth Year

Computer Science and Engineering (Artificial Intelligence)

(Effective from the Session: 2026-27)

NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA
(AN AUTONOMOUS INSTITUTE)

(Artificial Intelligence)

Evaluation Scheme

SEMESTER: VII

Sl. No.	Subject Codes	Subject Name	Types of Subjects	Periods			Evaluation Schemes				End Semester		Total	Credit
				L	T	P	CT	TA	TOTAL	PS	TE	PE		
WEEKS COMPULSORY INDUCTION PROGRAM														
1	BCSAI0701	Image Processing and Computer Vision	Mandatory	3	0	0	30	20	50		100		150	3
2		Departmental Elective-V	Departmental Elective	3	0	0	30	20	50		100		150	3
3		Open Elective –II	Open Elective	3	0	0	30	20	50		100		150	3
4		Open Elective-III	Open Elective	3	0	0	30	20	50		100		150	3
5	BCSAI0751	Image Processing and Computer Vision Lab	Mandatory	0	0	2				25		25	50	1
6	BCSE0759	Summer Internship Assessment	Mandatory	0	0	2				50			50	1
7	BCSE0758	Capstone Project -I	Mandatory	0	0	4				50		50	100	2
		MOOCs (For B.Tech. Hons. Degree)	*MOOCs											
		Total		12	0	8	120	80	200	125	400	75	800	16

List of MOOCs Based Recommended Courses for Fourth Year B. Tech Students

S. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credit
1	BMC0126	TechA Computer Vision Certificate	IIHT	17h 24m	1
2	BMC0138	Spring Boot and Angular-React Stack-DevOps Tools and Capstone Project	Infosys Wingspan (Infosys Springboard)	107h 50m	4
3	BMC0128	Microsoft Power BI Data Analyst (PL-300) by Microsoft	NASSCOM	13h 16m	1

List of Departmental Electives

Subject Codes	Subject Name	Type of Subject	Bucket Name	Branch	Semester
BCSE0712	RPA Implementation	Departmental Elective-V	CRM-RPA	AIML	7
BCSDS0711	Business Analytics	Departmental Elective-V	Data Analytics	AIML	7
BCSE0713	Web Development using MERN Stack with DevOps	Departmental Elective-V	Full Stack Development	AIML	7
BCSAI0711	Game Programming	Departmental Elective-V	Mobility Management	AIML	7

Abbreviation Used:

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam., PE: Practical End Semester Exam, CE: Core Elective, OE: Open Elective, DE: Departmental Elective, CA: Compulsory Audit, MOOCs: Massive Open Online Courses.

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Evaluation Scheme

SEMESTER: VIII

S. No.	Subject Codes	Subject Name	Types of Subjects	Periods			Evaluation Schemes				End Semester		Total	Credit
				L	T	P	CT	TA	TOTAL	PS	TE	PE		
1		Open Elective-IV	Open Elective	2	0	0	30	20	50		50		100	2
2	BCSE0858/ BCSE0859	Capstone Project-II / Industrial Internship	Mandatory	0	0	16				200		200	400	8
		MOOCs (For B.Tech. Hons. Degree)												
		Total		2	0	16	30	20	50	200	50	200	500	10

List of MOOCs Based Recommended Courses for Fourth Year B. Tech Students

S. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	BMC0059	TechA Build and Deploy Projects Certification	IIHT	13h 41m	1
2	BMC0152	Project Management with Agile	IIHT	14h 58m	1
3	BMC0118	Gen AI 101	NASSCOM	15h	1

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MOOCs: Massive Open Online Courses

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AICTE Guidelines in Model Curriculum:

A student will be eligible to get Under Graduate degree with Honours only, if he/she completes the additional MOOCs courses such as Infosys Springboard/NASSCOM/CISCO (as applicable) certifications, or any other online courses recommended by the Institute (Equivalent to 20 credits). During Complete B.Tech. Program Guidelines for credit calculations are as follows.

1. For 6 to 12 Hours =0.5 Credit
2. For 13 to 18 =1 Credit
3. For 19 to 24 =1.5 Credit
4. For 25 to 30 =2 Credit
5. For 31 to 35 =2.5 Credit
6. For 36 to 41 =3 Credit
7. For 42 to 47 =3.5 Credit
8. For 48 and above =4 Credit

For registration to MOOCs Courses, the students shall follow Infosys Springboard/NASSCOM/CISCO (as applicable) registration details as per the assigned login and password by the Institute these courses may be cleared during the B. Tech degree program (as per the list provided). After successful completion of these MOOCs courses, the students shall provide their successful completion status/certificates to the Controller of Examination (COE) of the Institute through their coordinators/Mentors only.

The students shall be awarded Honours Degree as per following criterion.

- i. If he / she secures 7.50 as above CGPA.
- ii. Passed each subject of that degree program in the single attempt without any grace.
- iii. Successful completion of MOOCs based 20 credits



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101-150 Rank Band in Engineering
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MBA|MCA



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Rating QS I-Gauge
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Course Code:BCSAI0701					Course :Image Processing and Computer Vision								L	T	P	C
Course Offered in: CSE(AI)													3	0	0	3
Pre-requisite: Python , Machine Learning ,Deep Learning																
Course Objectives:																
This course provides hands-on experience in key areas of Computer Vision and Image Processing. Students will explore image representation by visualizing pixel intensities and performing conversions between different color spaces. They will apply various image processing techniques, including filtering, image enhancement, and morphological operations such as Gaussian blur, edge enhancement, erosion, and dilation. The course also focuses on feature extraction methods such as Harris Corner Detection, SIFT, SURF, and ORB, followed by image classification using machine learning algorithms like Support Vector Machines (SVM) and Decision Trees.																
Course Outcome: After completion of the course, the student will be able to																
CO1	Explain fundamentals of computer vision, image representation, pixels, and color spaces.														K2	
CO2	Apply image processing techniques such as filtering, enhancement, and morphology														K3	
CO3	Implement feature extraction and classification methods for image analysis tasks.														K3	
CO4	Apply CNN models for image classification and object detection.														K3	
CO5	Analyze real-world computer vision applications in healthcare, biometrics, and surveillance.														K4	
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)																
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
CO1	3	2	-	-	2	-	-	-	-	-	-	1	2	2	1	
CO2	2	3	2	2	3	-	-	-	-	-	-	1	3	2	2	
CO3	2	3	3	2	3	-	-	-	1	-	-	2	3	3	2	
CO4	3	3	3	3	3	-	-	-	1	-	-		3	3	3	
CO5	2	2	3	3	3	-	-	-	2	1	-	3	3	3	3	
Course Contents / Syllabus																
Unit 1:				Image Processing & Computer Vision									08 hours			
Introduction of Information Processing, . Basic image file formats, Geometric and photometric models; Digitization - sampling, quantization; Image definition, its representation and neighbourhood metrics. Enhancement, contrast stretching, histogram specification, Introduction of Computer Vision - Low-level, Mid-level, High-level. Diverse Computer Vision Applications: Document Image Analysis, Biometrics, Evolution of CNN Architectures for Image, Recent CNN Object Recognition, Tracking, Medical Image Analysis																
Unit 2				Image Formation Models Feature Extraction									9 hours			
Edge Detection Edges - Canny, LOG, DOG; Line detectors (Hough Transform), Corners - Harris and Hessian Affine, SIFT, SURF, HOG, GLOH, Edge detection. Convolution operations; Morphological operations: erosion, dilation, opening, and closing; Introduction to Image Pyramids. Transfer learning , pre-trained models LeNet-5, AlexNet, VGGNet, GoogLeNet, ResNet50, Efficient Net, Mobile Net and Fast R CNN Architectures.																
Unit 3				Shape Representation and Segmentation									10 hours			

Contour based representation, Region Growing based representation, Deformable curves and surfaces, Snakes and active contours, Level set representations GraphCut, Mean-Shift, MRFs, Texture Segmentation; Image segmentation techniques: thresholding, region-based and edge-based segmentation. Image Segmentation Architectures, FCN Architecture, Upsampling Methods, Pixel Transformations, Geometric Operations, Spatial Operations in Image Processing, Semantic ,Instance Segmentation, Localisation, Intersection over Union (IoU).		
Unit 4	Motion Analysis & Object	10 hours
Background Subtraction and Modeling, Optical Flow, KLT, Spatio-Temporal Analysis, Dynamic Stereo; Motion parameter estimation. Retinanet, YOLO, CornerNet, Image Segmentation- U-Net, SegNet, Mask-RCNN, often from monocular video or sparse inputs. Transformer-Based Object Tracking (SwinTrack, MixFormer), Vision Transformers (Haar Cascades and Yolo), Performance evaluation and challenges in real-time vision systems.		
Unit 5:	Visualization and Use Cases	8 hrs
Feature maps and Active Visualization methods . Grad-CAM and Grad-CAM++ , Multimodal Vision-Language Models (CLIP, BLIP). Use Cases on Finger print recognition, Face detection and recognition, Object tracking, Medical image analysis, Sentiment Analysis (macro and Micro Expressions) , Medical Diagnosis etc.		
Total Lecture Hours		45 hours
Text Book		
S.No	Book Details	Author Name
1	Computer Vision-A Modern Approach, Pearson Education	Forsyth & Ponce
2	Computer Vision and Image Processing: Fundamentals and Applications, CRC Press, USA, ISBN 9780815370840 - CAT# K338147.	. M.K. Bhuyan
Reference Books		
1	Computer Vision-A Modern Approach, Pearson Education	Forsyth & Ponce
2	Computer Vision- Algorithms & Applications, Springer	Richard Szeliski,
Self-Study Content Links:		Duration (in Hrs)
MOOCs	1. NPTEL – Introduction to Computer Vision: https://onlinecourses.nptel.ac.in/noc23_ee118/preview?utm_source=chatgpt.com	20 Hrs
	2. Coursera – Deep Learning for Computer Vision : https://www.coursera.org/learn/convolutional-neural-networks?utm_source=chatgpt.com	
	3. edX – Fundamentals of Computer Vision: https://www.edx.org/learn/computer-vision?utm_source=chatgpt.com	
Video Lectures	1. OpenCV and Image Processing Tutorials : https://www.youtube.com/watch?v=yetsJWgYh0o&utm_source=chatgpt.com	15 Hrs`

	2. Object Detection and YOLO Tutorials : https://www.youtube.com/results?search_query=CNN+transfer+learning+tutorial&utm_source=chatgpt.com	
	3. CNN and Transfer Learning Lectures: https://www.youtube.com/results?search_query=CNN+transfer+learning+tutorial&utm_source=chatgpt.com	
Web References	1. OpenCV Documentation: https://docs.opencv.org	10Hrs
	2. TensorFlow Computer Vision Tutorials : https://www.tensorflow.org/tutorials/images	
	3. PyTorch Vision Tutorials : https://paperswithcode.com/area/computer-vision	
	4. Papers With Code – Computer Vision: https://paperswithcode.com/area/computer-vision?utm_source=chatgpt.com	



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Course Code: BCSE0712					Course : RPA IMPLEMENTATION								L	T	P	C
Course Offered in: CSE(AI)													3	0	0	3
Pre-requisite: Basic Knowledge of C Programming																
Course objective: This course is designed to give a thorough understanding and practical skills in developing and deploying software robots for Robotic Process Automation (RPA).																
Course Outcome: After completion of the course, the student will be able to																
CO 1	Apply basic concepts and methods from design engineering to explore creative solutions of real-world problems.													K3		
CO 2	Learn Robotic Process Automation, and massive career opportunity in this field.													K2		
CO 3	Implement the knowledge of RPA tools, functions in various industries and perform, control various tasks using RPA bots.													K3		
CO4	Gain expertise in Desktop, Web & Citrix Automation and use RE-Framework to build a structured business automation process.													K2		
CO 5	Develop a real-world workflow automation project and will be able to debug a workflow.													K6		
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)																
COs \ POs	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO3	
CO1	3	2	-	-	2	-	-	-	-	-	-	1	3	2	-	
CO2	2	3	2	1	3	-	-	-	1	1	-	-	3	3	1	
CO3	2	2	3	1	3	-	-	-	1	2	-	-	3	3	2	
CO4	2	3	2	3	3	-	-	-	2	1	1	-	2	3	2	
CO5	3	3	3	2	3	-	-	-	2	2	1	2	3	3	3	
Course Contents / Syllabus																
UNIT-I		DATA MANIPULATION											8 HOURS			
Introduction to Data Manipulation, Scalar variables, collections and Tables, Text Manipulation, Data Manipulation, Gathering and Assembling Data Recording and Advanced UI Interaction; Recording Introduction, Basic and Desktop Recording, Web Recording, Input/output Methods, Screen Scraping, Data Scraping, Scraping advanced techniques.																
UNIT-II		SELECTORS											8 HOURS			
Selectors, Defining and Assessing Selectors, Customization, Debugging, Dynamic Selectors, Partial Selectors, RPA Challenge, Image, Text & Advanced Citrix Automation, Introduction to Image & Text Automation, Image- based automation, Keyboard based automation, Information Retrieval, Advanced Citrix Automation challenges, Best Practices using tab for Images Starting Apps.																
UNIT-III		DATA TABLES AND AUTOMATION											8 HOURS			
Excel Data Tables & PDF, Data Tables in RPA, Excel and Data Table Basics Data Manipulation in Excel, Extracting Data from PDF, extracting a single piece of data, Anchors, Using anchors in PDF. Email Automation: Email Automation, Incoming Email automation, Sending Email automation.																
UNIT-IV		DEBUGGING AND EXCEPTION HANDLING											8 HOURS			
Debugging Tools, Strategies for solving issues, Catching errors. Orchestrator: Tenants, Authentication, Users, Roles, Robots, Environments, Queues & Transactions, Schedules.																
UNIT-V		ROBOTIC FRAMEWORK											8 HOURS			
Re-Framework template, Re-Framework template works, Use Re-Framework to automate your own processes. .NET Classes and Objects.																
Total Lecture Hours													40 HOURS			

Textbooks:	
1)	Vaibhav Jain, “Crisper Learning: For UiPath”, Latest Edition, Independently Published, 2018.
2)	Alok Mani Tripathi, “Learning Robotics Process Automation”, Latest Edition, Packt Publishing ltd, Birmingham. March 2018
Reference Books/E-Books:	
1)	Kelly Wibbenmeyer, “The Simple Implementation Guide to Robotic Process Automation (RPA)”, Latest Edition, iUniverse Press.
2)	https://www.uipath.com/hubfs/ebook-its-time-to-automate.pdf
Links:	
	https://www.youtube.com/watch?v=6QoCG6YIPVo&list=PL41Y-9S9wmyJarNN2KnB4XudpTlyE1kVd
	https://www.youtube.com/watch?v=YOHFgrOvPTM&list=PL41Y-9S9wmyLvF6Ou0oPhg6MrFWSw7sn4
	https://www.youtube.com/watch?v=QMBuyLMjOhM&list=PL41Y-9S9wmyIYX6kciM8DboVYymsv2y6K
	https://www.youtube.com/watch?v=KE9raKNTkfl&list=PL41Y-9S9wmyLeXL1DY9j-XepNb_vg9N8t
	https://www.youtube.com/watch?v=2rjr8QhD9oc&list=PL41Y-9S9wmyJi2zmWY77yPZrdVI7ab3Ja

Course Code: BCSDS0711	Course : BUSINESS ANALYTICS	L	T	P	C
Course Offered in: CSE(AI)		3	0	0	3

Pre-requisite: Basic knowledge of statistics, database systems, and spreadsheet tools such as Microsoft Excel.

Course objective: To learn the fundamental concepts of Business Analytics with focus on Data Warehousing and Business Statistics, enabling students to design data-driven decision systems, perform statistical analysis, and generate meaningful business insights.

Course outcome: After completion of this course students will be able to:

CO1	Understand concepts of Business Analytics and Data Warehousing	K2
CO2	Apply data preprocessing and SQL techniques	K3
CO3	Analyze data using statistical methods	K4
CO4	Design data warehouse and OLAP models	K5
CO5	Develop dashboards and reports	K5

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

COs \ POs	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO3
CO1	3	2	—	—	2	1	—	—	—	1	—	2	3	2	—
CO2	3	3	2	2	3	—	—	—	1	1	1	2	3	3	2
CO3	3	3	2	3	2	1	—	—	1	1	—	2	3	3	2
CO4	2	3	3	3	3	—	—	—	2	1	1	2	3	3	3
CO5	2	2	3	2	3	1	—	—	2	2	2	2	2	3	3

Course Contents / Syllabus

UNIT-I	Introduction to Business Analytics	8 HOURS
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Business Analytics: Definition, Importance, Scope. Types of Analytics: Descriptive and Diagnostic. Business Analytics vs Business Intelligence. Role of Data in Decision Making. Applications and Analytics Lifecycle.

UNIT-II	Data Warehousing	8 HOURS
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Data Warehouse Architecture: Fundamentals of Data Warehouse, Components of Data Warehouse, Three-Tier Architecture, Data Warehouse Models, Data Integration Techniques, Data Storage and Organization, **OLTP vs OLAP Systems:** ETL Process, Data Marts, Metadata, Star and Snowflake Schema, fact constellation schema.

UNIT-III	Business Statistics	8 HOURS
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Descriptive statistics: Definition and importance, Types, Measures of central tendency, dispersion, shape, **Probability distributions:** Basic concepts of probability, Random variables, Probability distribution functions, Expected value and variance, Applications in business decision-making, **Sampling:** Population vs Sample, Sampling techniques, Sampling distribution, **Hypothesis testing:** Concept of hypothesis, Types of errors, Statistical tests, Decision-making using hypothesis testing, **Correlation, Regression, Time series basics.**

UNIT-IV	R Programming for Business Analytics	8 HOURS
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Business Analytics Life Cycle, Model deployment, Steps in Problem Solving Process, Software used in Business Analytics, Getting Started with R. **Data Manipulation & Statistics:** Basics, Merging, Data Creation, Quantiles, Calculating Variance, Calculating Covariance, Cumulative Frequency, Library (mass), Head (faithful), Scatter Plot, Control Flow. **Business Analytics using R:** Normal PDF, Not Normal, SAT Example, Example- Birth Weights, dNorm, pNorm, qNorm, Understanding Estimation, Properties of Good Estimators, Central Limit Theorem, Kurtosis, Constructing Central Limit Theorem, Confidence Intervals for the Mean, Confidence Intervals Examples, t-distribution

UNIT-V	Dashboard Tools for Business Analytics : Zoho Analytics	8 HOURS
Getting started with Zoho Analytics - Terminologies & Workflows, Importing Data From Files, Feeds, and Cloud Storage, Data Modeling Building powerful Formulas Formatting Tables & Custom Sorting Lookups & Data Blending, Creating Reports Building Charts, Pivot Tables, Tabular Views, and Summary Tables Applying Filters Customizing Reports Chart picker guide, Creating Dashboards Creating a Dashboard Adding KPI Widgets Adding User Filters Customizing Dashboards Timeline Filter and Merging User Filters.		
		Total Lecture Hours 40 HOURS
Textbooks:		
1. Business Statistics – S.C. Gupta & V.K. Kapoor 2. Fundamentals of Data Warehousing – Paulraj Ponniah 3. Business Analytics – James Evans.		
Reference Books:		
1. Data Warehousing in the Real World – Sam Anahory 2. Excel Data Analysis – Wayne Winston 3. Data Warehouse Toolkit – Ralph Kimball		
Links:		
https://www.bmu.edu.in/social/delve-into-the-mba-in-business-analytics-syllabus-subjects/#Module_1 https://www.depaul.edu/academics/programs/business-analytics-ms?utm_content=772307929901&utm_term=business%20analytics%20universities%20usa&utm_medium=cpc&utm_source=google&utm_campaign=extm_international-nonbrand&gclid=CjwKCAjwwJzPBhBREiwAJfHRnLC70RK4_t99A9YQ2ggDt8bLEip3tvAFr7pTdVeDFjrHPRPd0ysNB0CijMQAvD_BwE https://sunstone.in/blog/mba-in-business-analytics-syllabus https://www.onlinemanipal.com/blogs/mba-in-business-analytics-subjects-list https://www.eicta.iitk.ac.in/knowledge-hub/data-analytics/business-analytics-course-syllabus https://noida.amity.edu/blog/academics/mba-in-business-analytics-syllabus-scope-colleges-and-career-opportunities https://management.buffalo.edu/degree-programs/master-of-science-ms/business-analytics/campaigns/ub-msba-landing-page-google.html?utm_source=google&utm_medium=cpc&utm_campaign=FM-PPC-UB-SOM-MS-BusinessAnalytics-International-Program&gad_source=1&gad_campaignid=13724693728&gclid=0AAAAADiSHE8chFADxOw5S7ybamtUqOhQ&gclid=CjwKCAjwwJzPBhBREiwAJfHRnXo9xdoI9IdhL1kZLNhxWW8F4rc3cWTbT2ApiuzLk02Ze7BT4Bws_BoChtAQAvD_BwE https://admission.isb.edu/admissions/amp/ampba/?utm_source=google&utm_medium=cpc&utm_campaign=AMPBA-B26_Google_Generic-Search_AI-Max_CPC_LP_GT&keyword=business%20analytics%20course&term={searchterm}&utm_source=google&utm_medium=cpc&campaignname=&adgroupname=Business_(Broad-Phrase)&keyword=business%20analytics%20course&term={searchterm}&creative=799773152771&devicemodel=&target=&device=c&network=g&matchtype=b&placement=&gclid=CjwKCAjwwJzPBhBREiwAJfHRnTC534j8TIwCvE55FA0ncZmj5yfvFg1htT4T2Nhw2UB7KCBOs0IQIRoCAE4QAvD_BwE&gad_source=1&gad_campaignid=23639572256&gclid=0AAAAABBTlpHKOhPhwiiAmtWB77e5nGEVe&gclid=CjwKCAjwwJzPBhBREiwAJfHRnTC534j8TIwCvE55FA0ncZmj5yfvFg1htT4T2Nhw2UB7KCBOs0IQIRoCAE4QAvD_BwE		



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CSE|IT|ECE|ME|BT
MBA|MCA



Prestigious 'Diamond'
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Course Code: BCSE0713					Course : WEB DEVELOPMENT USING MERN STACK WITH DEVOPS								L	T	P	C
Course Offered in: CSE(AI)													3	0	0	3
Pre-requisite: Student should have the knowledge of HTML, CSS and ES6																
Course objective: This course focuses on how to design and build static as well as dynamic web pages and interactive web applications. Students can understand how to put them together to create a MERN stack application.																
Course outcome: After completion of this course students will be able to:																
CO1	Apply the knowledge of ES6 that are vital to implement react application over the web.														K3	
CO2	Implement and understand the impact of web designing by database connectivity with MongoDB .														K3	
CO3	Explain, analyze and apply the role of server-side scripting language like Nodejs and Express js framework														K4	
CO4	Identify the benefits of DevOps over other software development processes to Gain insights into the DevOps environment.														K2	
CO5	Demonstrate popular open-source tools with features and associated terminology used to perform Continuous Integration and Continuous Delivery.														K3	
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)																
COs \ POs	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PS O2	PSO3	
CO1	3	2	2	–	3	–	–	–	1	1	–	2	3	3	2	
CO2	3	3	3	2	3	–	–	–	1	1	1	2	3	3	3	
CO3	3	3	3	2	3	–	–	–	2	1	1	2	3	3	3	
CO4	2	2	2	2	3	1	–	–	2	2	3	3	2	3	2	
CO5	2	2	3	2	3	1	–	–	2	2	3	3	2	3	3	
Course Contents/Syllabus																
UNIT-I		Introduction to React JS										8 HOURS				
Overview of frameworks, NPM commands, React App, Project Directory Structure, React Component Basic, Understanding JSX, Props and State, Stateless and Stateful Components, Component life cycle, Hooks, react-router vs react-router-dom,																
UNIT-II		Connecting React with mongodbB										8 HOURS				
Google Material UI, AppBar, Material UI's Toolbar, NavBar, Material UI Buttons, SQL and Complex Transactions, Dynamic Schema, create Index (), get Indexes () & drop Index (), Replication, Statement-based vs. Binary Replication, Auto-Sharding and Integrated Caching, Load balancing, Aggregation, scalability.																
UNIT-III		Node js & Express Framework										8 HOURS				
Introduction, Environment Setup, serving static resources, template engine with vash and jade, Connecting Node.js to Database, Mongoose Module, Creating Rest APIs, Express Framework, MVC Pattern, Routing, Cookies and Sessions, HTTP Interaction, User Authentication																
UNIT-IV		Evolution of DevOps										8 HOURS				
DevOps Principles, DevOps Lifecycle, DevOps Tools, and Benefits of DevOps, SDLC (Software Development Life Cycle) models, Lean, ITIL and Agile Methodology, Agile vs DevOps, Process flow of Scrum Methodologies, Project planning, scrum testing, sprint Planning and Release management, Continuous Integration and Delivery pipeline.																
UNIT-V		CI/CD concepts (GitHub, Jenkins, Sonar)										8 HOURS				

GitHub, Introduction to Git, Version control system , Jenkins Introduction, Creating Job in Jenkins, adding plugin in Jenkins, Creating Job with Maven & Git, Integration of Sonar, Dockers, Containers Image: Run, pull, push containers, Container lifecycle, Introduction to Kubernetes.	
Total Lecture Hours	40 HOURS
Textbooks	
1. Kirupa Chinnathambi, “Learning React”, 2 nd Edition 2016, Addison Wesley Publication.	
2. Mohan Mehul, “Advanced Web Development with React”, 2 nd Edition 2020, BPB Publications.	
3. Dhruti Shah, “Comprehensive guide to learn Node.js”, 1 st Edition, 2018 BPB Publications.	
4. Jennifer Davis, Ryn Daniels, “Effective DevOps: Building, Collaboration, Affinity, and Tooling at Scale”, 1 st Edition, 2016, O'Reilly Media Publication.	
5. John Edward Cooper Berg, “DevOps. Building CI/CD Pipelines with Jenkins, Docker Container, AWS (Amazon Web Services) ECS, JDK 11, Git and Maven 3, Sonar, Nexus”, Kindle Edition, 2019, O'Reilly Media Edition.	
Reference Books	
1. Anthony Accomazzo, Ari Lerner, and Nate Murray, “Fullstack React: The Complete Guide to ReactJS and Friends”, 4th edition, 2020 International Publishing. 	
2. David Cho, “Full-Stack React, Type Script, and Node: Build cloud-ready web applications using React 17 with Hooks and GraphQL”, 2nd edition, 2017 Packt Publishing Limited.	
3. Richard Haltman & Shubham Vernekar, “Complete node.js: The fast guide: Learn complete backend development with node.js” 5th edition, 2017 SMV publication.	
4. Glenn Geenen, Sandro Pasquali, Kevin Faaborg, “Mastering Node.js: Build robust and scalable real-time server-side web applications efficiently” 2nd edition Packt, 2017 Publishing Limited.	
5. Greg Lim, “Beginning Node.js, Express & MongoDB Development, kindle edition, 2019 international publishing.	
6. Daniel Perkins, “ReactJS Master React.js with simple steps, guide and instructions” 3rd edition, 2015 SMV publication.	
7. Peter Membrey, David Hows, Eelco Plugge, “MongoDB Basics”, 2nd edition, 2018 International Publication.	
Links: NPTEL/You Tube/Web Link:	
https://youtu.be/QFaFIcGhPoM?list=PLC3y8-rFHvwgg3vaYJgHGnModB54rxOk3 https://youtu.be/pKd0Rpw7O48 https://youtu.be/TIB_eWDSMt4 https://youtu.be/QFaFIcGhPoM	
https://youtu.be/Kvb0c_HWFkdc https://youtu.be/pQcV5CMara8 https://youtu.be/c3Hz1_qUUIyQ https://youtu.be/Mfp94RjugWQ	
https://youtu.be/SyEQLbbSTWg	
https://youtu.be/BLI32FvcdVM https://youtu.be/fCACK9ziarQ https://youtu.be/YSyFSnisip0 https://youtu.be/7H_QH9nipNs https://youtu.be/AX1AP83CuK4	

<https://youtu.be/2N-59wUIPVI> <https://youtu.be/hQcFE0RD0cQ>
<https://youtu.be/UV16BbPcMQk> <https://youtu.be/fqMOX6JJhGo>

<https://youtu.be/m0a2CzgLNsc> https://youtu.be/1ji_9scA2C4 <https://youtu.be/tulZok81iLk>
<https://youtu.be/1luhOk86prA> <https://youtu.be/13FpCxCCILY>



NIET
Greater Noida
Autonomous Institute

Noida Institute of Engineering & Technology, Greater Noida

नोएडा अभियांत्रिकी एवं प्रौद्योगिकी संस्थान, ग्रेटर नोएडा

(An Autonomous Institute)

Approved by AICTE, Affiliated to Dr. A.P.J. Abdul Kalam Technical University, Lucknow Uttar Pradesh, (Formerly Uttar Pradesh Technical University)



Course Code: BCSE0711	Course : GAME PROGRAMMING	L	T	P	C
Course Offered in: CSE(AI)		3	0	0	3

Pre-requisite: None

Course objective: The objective of this course is to understand the basic concepts of Game design and development. The course will help to build the programming skills needed to turn ideas into games.

Course outcome: After completion of this course students will be able to:

CO 1	Create VR experiences by setting up environments, interactions, and immersive elements using modern concepts of Game design.	K2
CO 2	Propose and design the processes and use mechanics for games.	K3
CO 3	Create 3D scenes with Unity and experiment with various user interface techniques that are used in VR AR applications.	K6
CO4	Create a 2D and 3D game in Unity and arrange Game programming platforms.	K6
CO 5	Evaluate and use emerging technologies and tools for creating interactive Games.	K5

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

COs \ POs	PO1	PO2	PO3	PO4	PO 5	PO6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO 3
CO1	3	2	2	1	3	—	—	—	—	1	—	2	3	3	2
CO2	3	3	2	2	3	—	—	—	1	1	1	2	3	3	2
CO3	3	3	3	2	3	—	—	—	2	1	1	2	3	3	3
CO4	2	2	3	2	3	—	—	—	2	2	1	2	3	3	3
CO5	2	3	3	3	3	1	—	—	2	2	2	3	3	3	3

Course Contents / Syllabus

UNIT-I	3D GRAPHICS FOR GAME PROGRAMMING	8 HOURS
3D Transformations, Quaternions, 3D Modeling and Rendering, Ray Tracing, Shader Models, Lighting, Color, Texturing, Camera and Projections, Character Animation, Physics-based Simulation, Scene Graphs.		
UNIT-II	GAME ENGINE DESIGN	8 HOURS
Game engine architecture, Engine support systems, Resources and File systems, Game loop and real-time simulation, Human Interface devices, Collision and rigid body dynamics, Game profiling.		
UNIT-III	GAME PROGRAMMING	8 HOURS
Application layer, Game logic, Game views, managing memory, controlling the main loop, loading and caching game data, User Interface management, Game event management.		
UNIT-IV	GAMING PLATFORMS AND FRAMEWORKS	8 HOURS
2D and 3D Game development, Game engines -Unity. Game Development & Documentation, Game Idea Visualization and Story Telling, Introduction to Unity interface.		
UNIT-V	GAME DEVELOPMENT	8 HOURS
Developing 2D and 3D interactive games using Unity – Isometric and Tile Based Games, Puzzle games, Single Player games, multi-Player games. Use of 3D Game Kit to create 3D platform gameplay and puzzles in Unity.		
Total Lecture Hours		40 HOURS
Textbooks		

1. Shaffrffy Mike Mc and Graham David, "Game Coding Complete", Fourth Edition, Cengage Learning, PTR, 2012.
2. Gregory Jason, "Game Engine Architecture", CRC Press / A K Peters, 2009
3. Eberly David H., "3D Game Engine Design, Second Edition: A Practical Approach to Real-Time Computer Graphics" 2nd Editions, Morgan Kaufmann, 2006.

Reference Books

1. Adams Ernest and Rollings Andrew, "Fundamentals of Game Design", 2nd edition Prentice Hall/ New Riders, 2009.
2. Lengyel Eric, "Mathematics for 3D Game Programming and Computer Graphics", 3rd edition, Course
3. Schell Jesse, The Art of Game Design: A book of lenses, 1st Editions, CRC Press, 2008.

Links:

Unit 1:

[Install the Unity Hub and Editor](#)

How to download and install Unity Editor using Unity Hub <https://learn.unity.com/tutorial/publish-your-first-mobile-runnergame>
<https://learn.unity.com/tutorial/platformer-mod-add-speed-and-bounce-pads#5d5af56dedbc2a005fb9216c>
<https://learn.unity.com/tutorial/quick-start?uv=2019.4&courseId=5c616a81edbc2a0021b1bd11&projectId=5c514897edbc2a001fd5bdd0#5c7f8528edbc2a002053b740> <https://learn.unity.com/project/3d-game-kit?uv=2019.4&courseId=5c616a81edbc2a0021b1bd11>

Unit2:

<https://learn.unity.com/project/3d-game-kit-lite>

Unit3:

<https://learn.unity.com/tutorial/3d-game-kit-reference-guide> <https://learn.unity.com/tutorial/next-steps-certifications-game-jams-and-beyond?courseId=6046c239edbc2a2720f9983b>

Unit4:

<https://learn.unity.com/tutorial/week-1-player-control-may-17-21?courseId=6046c239edbc2a2720f9983b>
<https://learn.unity.com/tutorial/week-2-basic-gameplay-may-24-28?uv=2020.3&courseId=6046c239edbc2a2720f9983b>

Unit5:

<https://learn.unity.com/project/unit-3-oi?uv=2019.4&courseId=5edebd48edbc2a444960263e>
<https://docs.unity3d.com/Manual/index.html>
<https://msl.cs.uiuc.edu/vr/vrbook.pdf>



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Course Code: BCSAI0751				Course :Image Processing and Computer Vision LAB										L	T	P	C
Course Offered in: CSE(AI)														0	0	0	2
Pre-requisite: Python , Machine Learning																	
Course Objectives:																	
The objective of this course is to provide students with a comprehensive understanding of the fundamental concepts of image processing and computer vision techniques. It enables learners to apply various feature extraction methods, machine learning algorithms, and Convolutional Neural Network (CNN) models for image classification and recognition tasks. The course also focuses on developing practical skills required to design and implement real-world computer vision applications.																	
Course Outcome: After completion of the course, the student will be able to																	
CO1	Understand image processing and computer vision fundamentals.													K2			
CO2	Apply segmentation, detection, and deep learning techniques for vision tasks.													K3			
CO3	Implement advanced vision applications using modern AI techniques.													K3			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)																	
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3		
CO1	3	2	1	1	2	-	-	-	-	-	-	1	3	2	1		
CO2	3	3	2	2	3	-	-	-	1	1	-	1	3	3	2		
CO3	3	3	3	3	3	-	-	-	2	1	2	2	3	3	3		
Course Contents / Syllabus																	
S.No	List of Practicals													CO			
1	Read, display, and save images in different formats (JPEG, PNG, BMP).													CO1			
2	Write a program to convert a color image (RGB) into grayscale.													CO1			
3	Program to convert RGB images into grayscale images.													CO1			
4	Visualization of pixel intensity distribution using image histograms. .													CO1			
5	Implementation of image sampling and quantization techniques.													CO1			
6	Perform contrast stretching for image enhancement													CO1			
7	Apply histogram equalization and histogram specification													CO1			
8	Implement edge detection using Sobel, Prewitt, and Canny Edge Detector.													CO2			
9	Write a program to perform erosion and dilation on an image													CO2			
10	Write a program to perform opening and closing operations.													CO2			
11	Use transfer learning with a pre-trained CNN (e.g.,VGG16 or ResNet) for feature extraction.													CO2			
12	Implement object detection using Fast R-CNN.													CO2			
13	Implement feature extraction using SIFT descriptors.													CO2			
14	Implement feature extraction using SURF descriptors													CO2			
15	Study transfer learning using pre-trained CNN models.													CO2			
16	Feature extraction using LeNet-5 and AlexNet,VGG.Google, architectures.													CO2			
17	Implement transfer learning using ResNet50 and EfficientNet													CO2			
18	Implement image thresholding (global and adaptive).													CO2			
19	Perform region-based segmentation (region growing).													CO2			
20	Apply edge-based segmentation techniques.													CO2			
21	Perform clustering-based segmentation using Mean Shift Algorithm													CO2			
22	Implement Graph-based segmentation using Graph Cut.													CO2			
23	Implement semantic segmentation using Fully Convolutional Network.													CO2			
24	Write a program to perform image segmentation using thresholding.													CO2			
25	Write a program to perform edge-based segmentation													CO2			
26	Implement background subtraction using frame differencing.													CO2			

27	Compute optical flow using Lucas-Kanade Method.	CO2
28	Perform motion detection using spatio-temporal analysis.	CO2
29	Implement object tracking using YOLO.	CO2
30	Write a program to detect multiple faces in an image using Haar Cascade.	CO2
31	Experiment with Vision Transformers (ViT-based models).	CO2
32	Implement object detection using RetinaNet	CO2
33	Study CornerNet based object detection	CO2
34	Case study: Human pose estimation from video.	CO2
35	Visualize feature maps of CNN layers.	CO3
36	Implement explainability using Grad-CAM and Grad-CAM++.	CO3
37	Implement vision-language models using CLIP.	CO3
38	Perform face recognition using deep learning.	CO3
39	Implement fingerprint recognition system.	CO3
40	Develop object tracking system for real-time video.	CO3
41	Apply computer vision in medical image analysis (tumor detection).	CO3
42	Analyze facial expressions (micro/macro expression recognition).	CO3
43	Mini Project: End-to-end Computer Vision system (choose domain: healthcare, surveillance, biometrics).	CO3