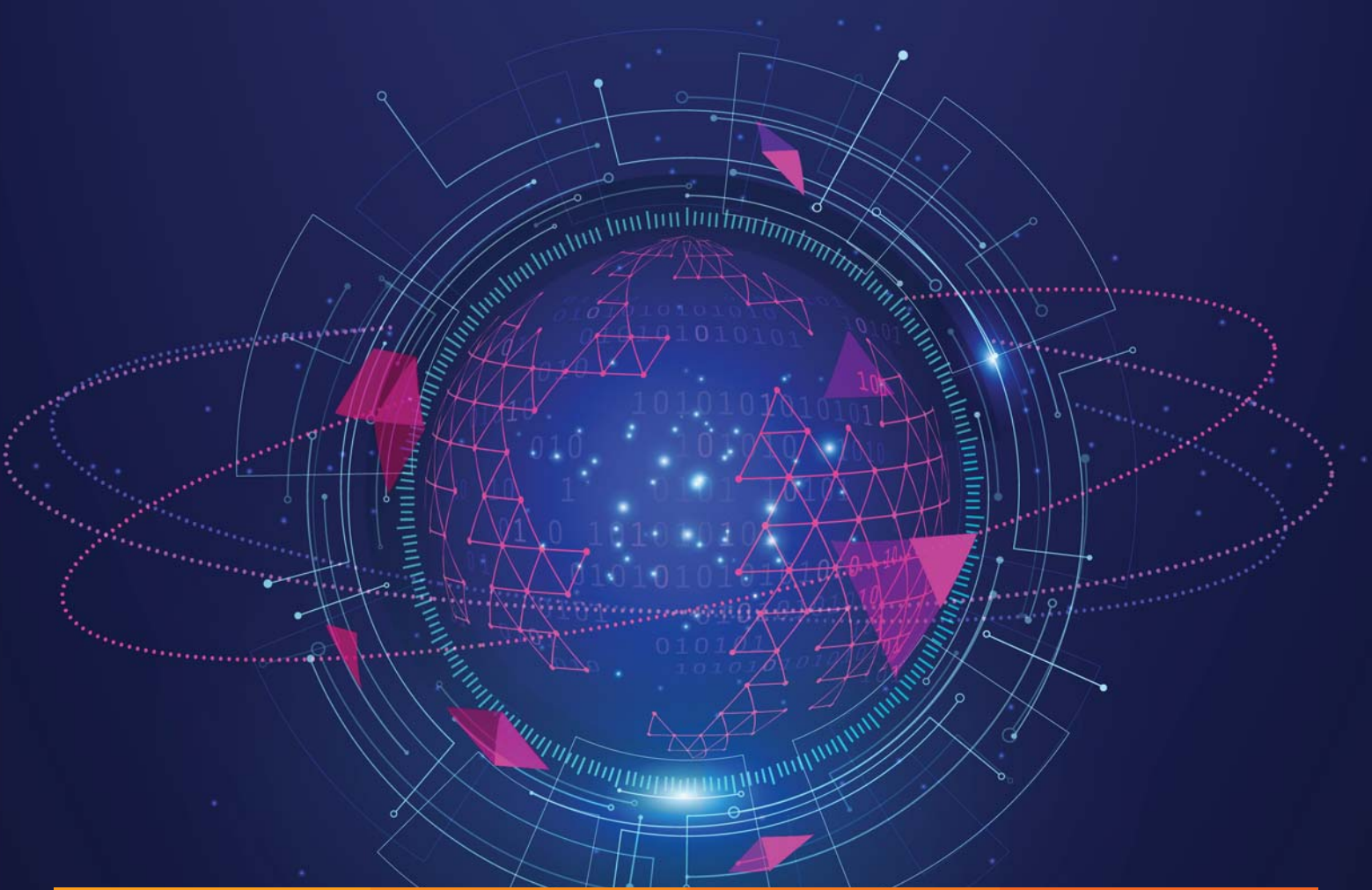


# PG DIPLOMA PROGRAM IN DATA SCIENCE



**10**

MODULES

**800**

HOURS

**10**

INDUSTRIAL  
PROJECT

**2**

CAPSTONE  
PROJECTS



भारतीय सूचना प्रौद्योगिकी संस्थान भागलपुर  
Indian Institute of Information Technology  
Bhagalpur

**IIIT-Bhagalpur in collaboration with Vitti offered  
“PG Diploma Program in Data Science”**

*in collaboration with*



**Silver**  
Business  
Partner



# ABOUT **IIIT-BHAGALPUR**

Indian Institute of Information Technology, Bhagalpur (IIIT Bhagalpur) is one of the IIITs set up by MHRD, Govt of India in PUBLIC-PRIVATE PARTNERSHIP (PPP) mode. It started functioning from the academic year 2017.

Bhagalpur is a city of historical importance on the southern banks of the river Ganges in the Indian state of Bihar. It is the 3rd largest city of Bihar and also the headquarters of Bhagalpur district and Bhagalpur division. Indian Institute of Information Technology Bhagalpur is a joint venture of Govt. of India (50%), Govt. of Bihar (35%) and BELTRON(15%).

IIIT Bhagalpur is being mentored by IIT Guwahati and thus it has access to academic expertise, resources and research oriented faculties of IIT Guwahati. Laboratories are set up under the expert guidance of IIT Guwahati.

# ABOUT **VITTI**

Vitti is India's first dedicated institution for Artificial Intelligence, Education, Research, and integrated, pervasive & highly scalable AIEd platform delivering equitable education for all. Vitti offers short to long duration courses in AI, Robotics, Machine Learning, and Cognitive Technology & Data Analytics in different formats e.g., weekend, online and class-room. AI is transforming the way we do business and live our lives. Intelligence re-engineering is creating software that doesn't just do what it is told, but has the ability to anticipate the needs of its users and customers through a combination of pattern recognition, knowledge, planning, and reasoning.



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# PROGRAM **OVERVIEW**

Prepare for a career in Data Science with the most comprehensive PG Diploma Program in Data Science to grow your career. Data science is a multi-disciplinary field that uses scientific methods, processes, algorithms and systems to extract knowledge and insights from structured and unstructured data, and apply knowledge and actionable insights from data across a broad range of application domains. This Data Science PG Diploma program is ideal for all working professionals, covering job topics like R, and Python programming, and machine learning algorithms, and NLP concepts, data visualization with Tableau through our interactive learning model with live sessions by global mentors, practical labs, IBM Hackathons, and capstone projects. Vitti has established an AI & Innovation hub in collaboration with IIIT- Bhagalpur and will continue to establish many such COEs in collaboration with academia and industry across the country. This program will enable you to develop deep understanding and experience with machine learning and data analysis. Familiarity with common tools for data management and analysis including machine learning can be applied on real world problems for building predictive models using machine learning on your own. After the completion of this PG course participants can appear for IBM Exam and get the digital certificate and badge from IBM.



# PROGRAM HIGHLIGHTS



11 months Online PG Diploma Program for Working Professional.



6 Weeks Project where you can solve the Data Science related business problems which will help you to grow your career.



Comprehensive and Rigorous Curriculum covering Key Concepts & Technologies of Artificial Intelligence & Machine Learning.



Participants who will successfully complete the PG Diploma Program will become members of IIIT- Bhagalpur alumni.



Online Assessment/ Examination.

## THIS PROGRAM OFFERS YOU TO BE :

- DATA ANALYST
- DATA SCIENTIST
- DATA SCIENCE CONSULTANT
- BUSINESS ANALYTICS CONSULTANT
- BUSINESS INTELLIGENCE ANALYST
- DATA MINING SPECIALIST
- CRM DATA ANALYST
- RESEARCH DATA ANALYST

# PROGRAM FEATURES



**EXPERIENTIAL LEARNING:** Engaging Case Studies, Projects and Hackathon for Effective Learning



**INDUSTRY-ENDORSED CURRICULUM:** Learn about popular tools and techniques used by most of Data Analysts and Data Scientists



**INDUSTRY MENTORSHIP:** Dedicated Industry Leaders to guide you through any career-related queries and shape your career roadmap



**IIIT BHAGALPUR IMMERSION:** Connect with IIIT- Bhagalpur Experts and develop your Professional Network.



**TECH-ENABLED LEARNING:** Learning in Technologically-augmented Classrooms, Enhanced with Live Lectures



**LMS EXCLUSIVE:** Access to Vitti learning Portal for additional Learning and Assessments



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# COURSE DELIVERY **METHODOLOGY**



## **INSTRUCTION**

Live lectures with our expert faculty supplemented by additional learning material on LMS.

### **Benefits:**

- In-depth understanding of concepts
- Real-time interaction and query resolution
- Additional self-learning at your own convenience

**Used for:** Live instructions by expert faculty and additional self-learning opportunities.



## **REINFORCEMENT**

Practical Hands on Experience: Hands-on experience with rigorous exercises, real-world projects & case studies to solve real business problems. Participate in competitive boot camps and hackathons.

### **Benefits:**

- Develop competency to solve real business problems with data science techniques
- Develop competitive skills to stand out in a crowd
- Be job ready from Day 1

**Used for:** Learning real-world applications of popular data science tools and techniques.



## **ASSESSMENTS**

Work on quizzes and assignments to test your knowledge, along with mock interviews and exams.

### **Benefits:**

- Gauge your progress throughout the program
- Identify areas of improvement and learning gaps
- Build confidence for the placement phase

**Used for:** Ensuring consistent progress over the course of the program and preparing for job opportunities.

# CERTIFICATE

IIIT- Bhagalpur “PG Diploma Program in Data Science”



## SPECIAL NOTE

After completion of this course, student who will pass the IBM Exam they will get the Digital Certificate and Badges from IBM



# PROGRAM CONTENT

PG DIPLOMA PROGRAM IN DATA SCIENCE

**Duration: 800 Hrs.**

## SEMESTER - 1

### 1. Introduction to Programming and Data Structures

- **Programming Overview**
- **Python Programming**
  - Fundamentals, Installation, Basic Syntax
  - Data or Variable Types & Basic Operators
  - Decision making & Loops
  - Numbers & Strings
  - List, Tuples & Dictionary
  - Functions & Modules

### 2. Data Science and Data Analysis

- **Data Science Landscape**
  - Data Science Overview
  - Data Science Domains
  - Data Science Roles
- **Data Science**

### Methodology

- Data Analytics in Practice
- Data Analytics Methodologies
- Data Science Method

### • Explore And Prepare Data

- Business understanding
- Explore data
- Prepare data
- Understanding data

### • Represent and Transform Data

- Statistics and representation techniques
- Data transformation
- Represent and transform unstructured data
- Data transformation tools

### • Data Visualization and Presentation

- Decision-centered Visualization

- Fundamentals of Visualizations
- Common Graphs & Common Tools

### • Data Science On The Cloud

- Integrated environment for Data Science projects
- Cloud-based Data Science Lifecycle
- Data Science capabilities on the cloud

### • Mathematics In Data Science

### • Ethics For Data Science

### 3. Artificial Intelligence

- **Introduction to AI**
- **AI Landscape**
  - AI impact in the world today
  - History and Evolution of AI
  - AI Explained

<ul style="list-style-type: none"> <li>□ AI Technologies</li> <li>□ Summary &amp; Resources</li> <li>● <b>AI Industry Adoption Approaches</b> <ul style="list-style-type: none"> <li>□ AI Industry Impact</li> <li>□ Autonomous Vehicles</li> <li>□ Smart Robotics</li> <li>□ Future Workforce and AI</li> <li>□ Summary &amp; Resources</li> </ul> </li> <li>● <b>Problem Solving Through Search, Bayesian Networks, Propositional Logics</b></li> <li>● <b>Introduction To ML And DL, AI Issues, And Ethics.</b></li> <li>● <b>Natural Language Understanding</b> <ul style="list-style-type: none"> <li>□ NLP Overview</li> <li>□ NLP Explained</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>□ Virtual Agents Overview</li> <li>□ Virtual Agents for the Enterprise</li> <li>□ Summary and Resources</li> <li>● <b>Computer Vision</b> <ul style="list-style-type: none"> <li>□ Computer Vision Overview</li> <li>□ AI Vision through Deep Learning</li> <li>□ Computer Vision for the Enterprise</li> <li>□ Experiments</li> <li>□ Summary and Resources</li> </ul> </li> <li>● <b>Future Trends for AI</b> <ul style="list-style-type: none"> <li>□ Artificial Intelligence Trends</li> <li>□ Limits of machine and human</li> <li>□ AI predictions in the next 5 years</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>□ Summary and Resources</li> <li>4. <b>Software Engineering</b> <ul style="list-style-type: none"> <li>● <b>SDLC,</b></li> <li>● <b>Software Requirements</b></li> <li>● <b>Feasibility Study</b></li> <li>● <b>Importance</b></li> <li>● <b>Version Control</b></li> <li>● <b>Github</b></li> <li>● <b>Software Testing</b></li> </ul> </li> <li>5. <b>Capstone Project</b> <ul style="list-style-type: none"> <li>● <b>Design Thinking And Innovation</b></li> <li>● <b>Industry Required Problems</b></li> <li>● <b>Expert Lectures From Industry.</b></li> </ul> </li> </ul>
<b>SEMESTER 2</b>		
1. <b>Statistical Methods</b> <ul style="list-style-type: none"> <li>□ Introduction to Random Variable</li> <li>□ Mean</li> <li>□ Variance and Covariance of Random variable</li> <li>□ Probability Distribution, Continuous Probability Distributions</li> </ul>	<ul style="list-style-type: none"> <li>□ Stochastic processes and Markov chains</li> <li>□ Area under curve</li> <li>□ Regression analysis</li> <li>□ Multiple regressions</li> <li>2. <b>Machine Learning</b> <ul style="list-style-type: none"> <li>□ Introduction to ML</li> <li>□ Classification</li> <li>□ Regression</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>□ Clustering</li> <li>□ Supervised and Unsupervised learning</li> <li>□ Bias and Variance</li> <li>□ Evaluation metrics</li> <li>□ ML algorithms</li> <li>□ Linear and Logistic regression</li> <li>□ K-means</li> <li>□ SVM</li> <li>□ Decision tree</li> </ul>



<ul style="list-style-type: none"> <li>□ random forest</li> <li>□ Ensemble</li> <li>□ LDA</li> <li>□ Recommendation system</li> <li>□ Ethics.</li> </ul>	<ul style="list-style-type: none"> <li>□ Recurrent Neural Networks</li> <li>□ LSTM</li> </ul>	<p>Optimization</p> <ul style="list-style-type: none"> <li>□ Compression</li> <li>□ RBM</li> <li>□ DBN.</li> </ul>
<h3>3. Deep Learning</h3> <ul style="list-style-type: none"> <li>□ Introduction to DL,</li> <li>□ Difference to ML</li> <li>□ Neural network</li> <li>□ Multilayer perceptron</li> <li>□ SGD</li> <li>□ loss functions</li> <li>□ Deep Neural Network</li> <li>□ Optimizers</li> <li>□ Hyper parameter</li> <li>□ Convolutional Neural Networks</li> </ul>	<h3>4. Advance Deep Learning</h3> <ul style="list-style-type: none"> <li>□ CNN Visualization</li> <li>□ Auto encoder-Decoder</li> <li>□ GAN</li> <li>□ Natural Language Processing</li> <li>□ Reinforcement learning</li> <li>□ Deep Generative Models</li> <li>□ Advanced Object Detection: YOLO v3</li> <li>□ Image Segmentation: FCN, SegNet, UNet</li> <li>□ Deep Learning Model</li> </ul>	<h3>5. Artificial Intelligence trends</h3> <ul style="list-style-type: none"> <li>□ Limits of machine &amp; human</li> <li>□ AI predictions in the next 5 yrs.</li> <li>□ Summary &amp; Resources.</li> </ul> <h3>6. Capstone Project</h3> <ul style="list-style-type: none"> <li>□ Design thinking and innovation</li> <li>□ Industry required problems</li> <li>□ Expert lectures from industry</li> </ul>

## WHO SHOULD ATTEND

- PG Diploma Program in Data Science is a two semester program which will help all the working Professionals to grab the opportunity from the market to enhance their career as a Data Science Engineer or Data Scientist.
- Participants who are willing to pursue their career in Artificial Intelligence can join this online course of 800 hrs.
- Participants who are graduate from Mathematics/ statistics and from engineering background can join this program.
- Participants who have the knowledge of Programming they can also join this course.

# FACULTY PROFILE



## DR. A. K. SINHA

He is one of the members of the Advisory Board of Universal Systems Technology, Inc, USA. Holds a PhD degree in Systems Modelling from IIT Delhi, M.Tech (Control System) from IIT Delhi and B.Sc. Engineering from Bihar University.

He has 35 years of teaching, research, and consultancy experience in the various fields of computer science along with AI & ML. Guided 7 Ph.D. and more than 30 M.Tech scholars.

He is a well-known name in the field of AI space.



## DR. DEEPTI YADAV

She is an enthusiastic Data Scientist with 16 years of experience in teaching, research & consultancy and holds Ph.D. in machine learning based data analysis from IIT (Roorkee). Currently, she resides in Silicon Valley, USA and provides consultancy services.



## KUNAL GERA

Kunal is an educator, mentor, author, and consultant. Worked as a business and data Analyst with 10+ years of international and domestic experience. Worked for numerous industries in US, Canada, Africa, Australia, and Gulf countries. Worked on projects such as consumer analytics, credit card analytics, NLP implementation, and computer vision.



## DR. RUPAM BHATTACHARYYA

Rupam Bhattacharyya is Ph.D. in Computer Science & Engineering from Tezpur University. Recipient of Scholarship by University of Stirling, Scotland, UK, GATE Scholarship, and got Williamson Magor Scholarship. Certified FPGDST from CDAC Bangalore. Presently Teaching at IIIT Bhagalpur.



### DR. SANDEEP RAJ

Sandeep Raj (Member, IEEE), Ph.D in Electrical Engineering from IIT, Patna, Currently serving as an Assistant Professor with the Deptt. of Electronics and Communication Engineering, IIIT- Bhagalpur. He served as a Visiting Faculty with the National Institute of Technology Patna. His current research interests include biomedical signal & image processing, embedded systems, machine learning, and Internet-of-Things.



### DR. DILIP KUMAR CHOUBEY

He is Ph.D. in Engineering from Birla Institute of Technology, Ranchi and has more than 9 years teaching & research experiences. He is an Assistant Professor in the Deptt. of Computer Science & Engineering, IIIT- Bhagalpur. He is a author of 2 book and has more than 44 reputed research publications in international journals, book chapters and conference proceedings. He has also one project as a Co-PI funded by TEQUIP Collaborative Research Scheme.



### P.V. CHANDRIKA

She is professionalized in Data Analysis using Statistical Analysis, Data Visualization using Tableau, Google Analytics, and Application of Machine Learning and Deep Learning Algorithms using Python and R. Also working as a corporate trainer and educator with around 4 years of freelancing experience and 10 year of training experience. Develop the course curriculum with respect to industry requirements.



### DR. DIPANKAR RAY

Software Engineer at Indian Institute of Technology (Indian School of Mines), Dhanbad. He has the 7 years of Teaching Experience (M.Tech, B.Tech, MCA, BCA).

- **Ph.D. Supervised:** Computer-Aided Orebody Modeling and Mine Valuation, 2015
- **M.Tech/M.Sc/MCA Projects Supervised:** 8 projects supervised
- **Sort Term Professional Courses organized:** 5 courses on Linux, MATLAB, Image Processing, R.

# INDUSTRY EXPERTS



## KUNDANA LAL

As part of the founding team of Vitti, Kundana Lal is the President @ Vitti. Kundana brings over 25 years of industry experience in various IT-related senior leadership role, building businesses, handling corporate and marketing strategies, solidifying profitable relationships with Fortune 500 companies. He was Vice President with Capgemini heading Cloud & AD deliveries for Continental Europe. He has done his Masters in EEE from BIT, Ranchi with specialization in Artificial Intelligence.



## SHWETANK SHARAD

He is a Managing Partner on the Executive Board of Vitti. He is a Senior Executive with over 25 years of experience in IT, ITES/ Business Process Services covering Business Transformation, Robotic Process Automation (RPA), Artificial Intelligence and Service Excellence. He is a GE certified Six Sigma Master Black Belt, Certified Robotic Process Automation and Artificial Intelligence-Machine Learning (AI-ML) professional.



## SHASHIKANT CHOUDHARY

He completed his MBA in Marketing & IT in 2001 from Symbiosis Institute of Management Studies, Pune. He has more than 19 years of enriched and diverse experience in IT Sales and Business Development in Companies such as, Oracle India, Wipro Technology, and BMC Software etc. He has rich experience of engaging at leadership levels in Govt. and PSUs.





### **DR. DILIP NANDKEOLYAR**

An alumnus of Asian Institute of Management Manila Philippines, DR. DILIP NANDKEOLYAR is a Management post graduate, specialized in Marketing and Strategic Planning & is a B.Sc. (Hons) in Chemistry. He has a Doctoral degree from Thapar University, Patiala.

The guiding philosophy behind all the endeavours of Dr. Nandkeolyar has always been to succeed because his Employers, Peers, Subordinates, Customers, Clients, Students/ Trainees or anyone choosing to associate with him must – by delivering value plus.



### **SOUMITRA PODDAR**

He is one of the distinguished alumni of Vinod Gupta School of Management, IIT Kharagpur. He graduated from the institute in the year 1995 after achieving his specialization in Finance and Information Systems. Before coming to VGSoM, he worked with Mastek Limited as a consultant and gained a good technical exposure of the industry. Later in 2002, he joined IBM and with his managerial acumen, today he has reached the level of Delivery Project Executive.



### **VANESSA KLOTZMAN**

A USA based Software Engineer Gained experience with performance analysis and optimization from a database perspective. She has worked closely with the SIMBA administration team in the Walt Disney Company to develop a self-service portal for all SIMBA users. This portal assist the SIMBA users in submitting requests to the administration team and aid in the automation of manually intensive tasks.



### **YOGESH PARGAIEN**

Experienced and driven data scientist with rich experience in the industry. Conducted individual training sessions for employees in Microsoft Azure, Big Data Tools & Technology, Machine Learning and Amazon Web Services. Trained 30+ groups in Big Data technology stack along with machine learning and projects.



## DARSHAN DAVE

Darshan Dave: Darshan is a trusted advisor to CXO's and Founders. A seasoned executive with 28+ years of IT experience. Highly skilled at unlocking growth, harnessing emerging technologies, incubating and accelerating products and services, mentoring high performing leaders and teams.

He has global experience with Fortune 500 organizations across the globe, and has worked in the UK, Germany, India and USA. He has held leadership positions in global organizations and held titles of Managing Director, Global Head and Vice President and Head of Digital Practices to name a few.



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Partner



## ADDRESS FOR COMMUNICATION

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W.E.A. Karol Bagh, Delhi - 110005

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Or Call at: **1800 270 2060**