CERTIFICATE PROGRAMME IN **TECHNOLOGY AND MANAGEMENT**

DATA SCIENCES | MACHINE LEARNING

Blended Programme By

Indian Institute of Technology Madras &
Indian Institute of Management Bangalore

Programme Directors

Prof. PD Jose, IIM Bangalore
Prof. Balaraman Ravindran, IIT Madras

For successfully leading tomorrow's organizations, an in-depth understanding of technology and management practices are critical. The Certificate Programme in Technology and Management (CTM) was designed with the express purpose of meeting this need. A joint effort by two of India's leading educational institutions, CTM aims to equip students with a deep understanding of recent developments in technology and modern theories of management.

The Certificate Programme in Technology and Management (CTM) is a 11 months programme, which aims at expanding learners' technical know-how and broadens the scope for higher-level management opportunities. It brings together a unique, active learning blend of technical and business skills for working professionals. The technical courses are offered by Indian Institute of Technology, Madras and the management courses are offered by Indian Institute of Management, Bangalore.

Objectives

To help professionals achieve a transformation to the highest levels of leadership in their companies. The programme will help participants to:

Gain a broad overview of the key concepts, tools and techniques needed to successfully meet the challenges of today's global business environment.

Acquire deep-rooted knowledge on quantitative and statistical tools to make effective decisions.

Focus on the skills required to work cross-functionally within the organizations.

"A multi-disciplinary education that combines the best of technology and management disciplines to empower young leaders of tomorrow. CTM is a great way for young working professionals to acquire domain and business understanding, while being employed, with the help of specially crafted MOOCs"

G Raghuram,
Director, IIM Bangalore

"The Certificate Programme in Technology and Management from IIT Madras and IIM Bangalore is a breakthrough for professionals who aim to excel in the fields of technology and management. This fusion will turn an ordinary learner into a dynamic intellectual"

Bhaskar Ramamurthi,
Director, IIT Madras

"After serving in the defence forces for 20 years and having experience both in operations and technology, this programme came as a perfect match to learn the nuances of the same, in the industry. The biggest highlight is the unique blend of technology and management with IIMB and IITM are your mentors. The subjects are covered with such clarity and detail, the learning is both satisfying and rewarding. This is possible due to the world class faculty, a thorough professional team and a stiff course schedule which is demanding, to say the least. I enjoyed my journey being a student once again."

Col Vinay Sharma, Serving Officer, Indian Army

"All through my 12 year career, I have worked in the infrastructure side of the software systems. When I was looking for a course in an alternate domain like Data Science from premium institutes, there was nothing like CTM which is backed by IIMB & IITM. It gives a holistic view on the technical and the management perspective. The classroom sessions proved to be a great learning experience. This programme will open the gates to the Data Science perspective for someone looking for a career in this domain or to have a better understanding of the complete picture. The journey has been challenging but with a lot of learning. This is much more than a certification program and the industry needs more of this kind."

Raghavendra, Technical Analyst, World Bank

"Being in IT industry for a sufficient period of time, the scope of growth was becoming limited. CTM was the perfect choice when I wanted to broaden my choices in my career. The unique feature was that we get to learn both Technical (Data Science/Machine Learning) and Management subjects under one roof. Another striking aspect was diversity of the batch comprising students from other nationalities, expats & other industries, that I could not have experienced at any other place. This course is a perfect pit stop, where a person could imbibe the learnings from eminent professors to enable their personal & professional growth."

Pavan Nandyala, Project Manager, Infosys

Programme Structure

CTM is a 11-month long programme, offered in four modules. Each module comprises technical and management courses. At the end of each module, proctored exams will be conducted. On successful completion of the programme, the participants receive a Certificate in Technology and Management. This is a joint certificate from IIT Madras and IIM Bangalore. The programme consists of six core management courses and two technical disciplines, Data Sciences and Machine Learning
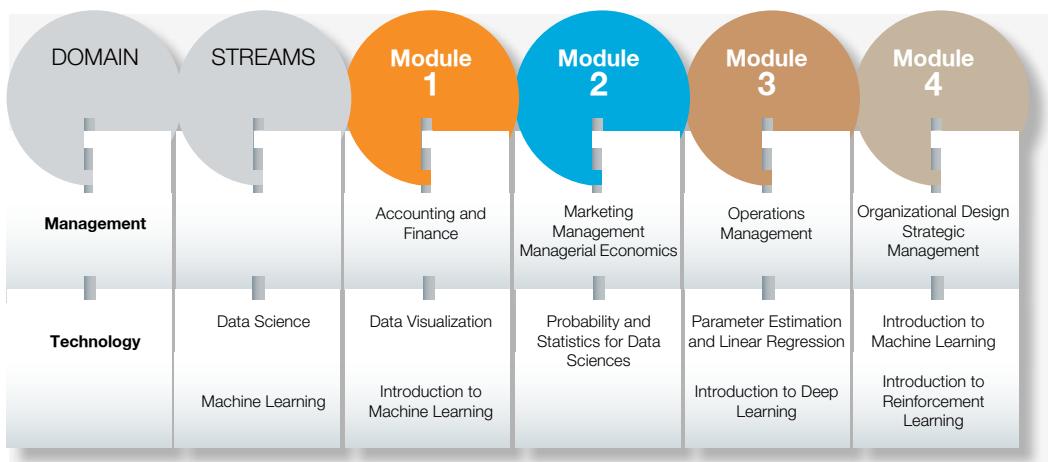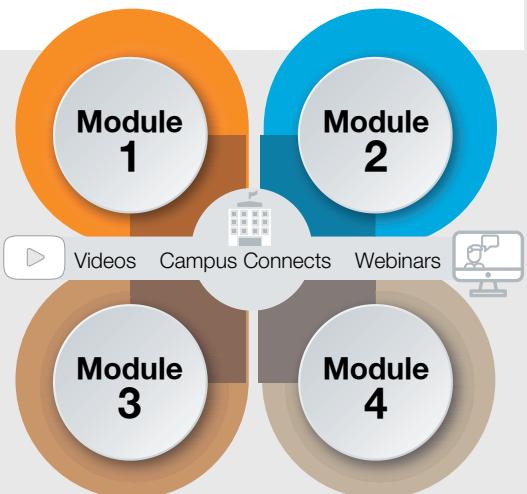
- The Data Science Stream equips students in data-driven computing and covers the essential topics such as Mathematical Foundations, Data Visualization and Machine Learning.

- The Machine Learning Stream prepares students to start a career in AI. This covers the fundamental concepts as well as areas such as Deep Learning and Reinforcement Learning.

While the management courses are mandatory, the learner has the option to choose one of the two technical specialization streams.

Programme Pedagogy

A balanced mix of synchronous and asynchronous interactive sessions, along with projects and case discussions for an enhanced learning experience.

Videos · Campus Connects · Webinars

	DOMAIN	STREAMS	Module 1	Module 2	Module 3	Module 4
Management			Accounting and Finance	Marketing Management Managerial Economics	Operations Management	Organizational Design Strategic Management
Technology		Data Science	Data Visualization	Probability and Statistics for Data Sciences	Parameter Estimation and Linear Regression	Introduction to Machine Learning
		Machine Learning	Introduction to Machine Learning		Introduction to Deep Learning	Introduction to Reinforcement Learning

"I came from Korea to start a new business in India. Through CTM, I could overcome the limitations of time and place to take classes, and campus sessions gave me the opportunity to dive into Indian society actively. Most of all, it is an unforgettable experience to discuss and study in a classroom with Indian experts from various fields."

Jaegon Lee, Senior General Manger, Kia Motors India

"Given the increasing focus on innovation across all sectors, learning has become a continuous lifelong process. CTM has enabled me to learn about the current market trends in both technical and management stream. It has the perfect blend of classroom plus online learnings which helps working professionals to go through the course in a flexible yet organised manner. Additionally, the group/individual project work, webinars, plant visit, discussion forums help acquire a deeper knowledge through active exploration of real-world challenges and problems. I am positive that learning the core management concepts and acquiring a strong foundation in Data Science will help me perform and contribute in a more effective manner, both as a consultant and team leader."

Meenu Dwivedi, Assistant Manager, EY

Continuous education is essential for successful career and self-development. When I started looking for selection of courses, I was thoroughly confused about the many options for management only courses, and when I came across CTM, I knew this was the perfect one that I was looking for. The course is a mix of modern management theory and latest technology, which is going to change the future of technology.

Ashwini Kumar Viswanathan, Vice President, Head of Data and Analytics, InfraHedge Inc.

Programme Curriculum

1 Accounting and Finance

This business course helps students read and understand financial statements to evaluate how business performance is affected by four fundamental drivers of profitability viz., asset management, cost management, leverage management and tax management. It will also help students to identify areas for improvement. The second part of this finance course deals with managing costs. Students will learn how to prepare cost sheets, budget and make cost-based decisions. The third part of the course provides an overview of financial markets to raise capital of different types. Students will develop the ability to prepare and evaluate finances for their business plan and manage working capital.

Instructor: MS Narasimhan, IIM Bangalore

2 Data Visualization

This course is designed to explain and explore data. Few topics covered in the course are performing exploratory data analysis and create static reports, with data visualization, creating group charts and static dashboards, through flex dashboard, creating interactive dashboards using R Shiny.

This course will also cover the grammar of graphics, design principles and guidelines to pick relevant charts depending on the analysis. Real-time data sets will be used to come up with interesting stories.

Instructor: Kathirmani, Co-founder, Quelit

3 Introduction to Machine Learning

This course introduces the fundamentals of machine learning. The course dives deep into supervised (linear regression, logistic regression, neural networks, KNN etc.) and unsupervised (clustering, dimensionality reduction etc.) learning paradigms. Use of examples and visual interpretations will reinforce the learning in beginners. By the end of this course, students should have a strong understanding to follow the current happenings in the area.

Instructor: Balaraman Ravindran, IIT Madras

4 Introduction to Reinforcement Learning

Reinforcement Learning (RL) methods have achieved significant successes recently by marrying the representation learning power of deep networks and the control learning abilities of RL. This has resulted in some of the most significant recent breakthroughs in Artificial Intelligence such as the Atari game player and the Alpha Go engine from Deepmind. This success has renewed interest in the RL community and enabled new applications. This course will introduce the basic reinforcement learning paradigm and methods for solving the reinforcement learning problem. We will motivate the concepts through practical examples.

Instructor: Balaraman Ravindran, IIT Madras

5 Introduction to Deep Learning

Deep Neural Networks are behind the recent significant impact of AI systems. In this course, we will cover the fundamentals of neural networks and the basic deep neural architectures such as convolutional networks and recurrent networks. The course will also introduce learners to popular deep learning tools and will have many case studies.

Instructor: Balaraman Ravindran, IIT Madras

6 Managerial Economics

To make professionally sound decisions, it is important to understand the market forces that impact the business world. Most modern societies depend on markets to organize economic activity; in other words, they are market economies. This course will give students an introduction to managerial economics and use minimum mathematics.

Instructor: Subhashish Gupta, IIM Bangalore

7 Marketing Management

While the significance of marketing in today's business world can never be overstated, it is the precise understanding and appreciation of marketing management that needs to be accentuated. Marketing management allows an organization to track, review and analyze their marketing resources and activities. In this marketing course, students will learn the fundamentals of marketing management, advanced theories and applications through real world business examples, illustrations, cases and exercises.

Instructor: Ashis Mishra, IIM Bangalore

8 Operations Management

Operations Management focuses on carefully managing the processes to produce and distribute products and services effectively and efficiently. This course will empower students with skills to address important aspects of business operations including capacity, productivity, quality, and supply chain. The course will help students to estimate, compute, analyze and configure key elements of Operations management.

Instructor: B Mahadevan, IIM Bangalore

9 Organizational Design

In this course, the student will learn how to design control systems, decision-making processes, and a culture that enables value-creation and the development of sustainable competitive advantage. The relationship between an organization's strategy and structure, leveraging design elements, and understanding how best to manage structural changes will be explored.

Instructor: Sourav Mukherji, IIM Bangalore

10 Strategic Management

Managing a firm implies that one will have to conduct an analysis of the industry in which he or she operates, and work towards creating and sustaining a competitive advantage. This course will show students how a business views itself in its "totality" and in the context of its environment. The course will be taught from the perspective of a manager or chief executive officer (CEO).

Instructors: PD Jose, Sai Yayavaram, Rejie George, IIM Bangalore

11 Parameter Estimation and Linear Regression

The course is aimed at imparting the basics of estimation theory to the learner. Specifically, answers to the following three broad questions shall be obtained through this course. (a) What is the role of estimation in the field of data science? (b) How could unknowns be estimated (problem formulation and methodology)? (c) How could the goodness of estimates (confidence levels) be characterized?

It is pitched at a beginner's level and designed to provide a healthy balance of theory and practice. The lectures, consequently, comprise the necessary formalizations interweaved with illustrative and worked out examples. Software support for this course is provided by R (a free, open-source computational and statistical software), which is available on all three major operating platforms (Windows, Mac OS and Linux) at https://cran.r-project.org/

Instructor: Arun Tangirala, IIT Madras

12 Probability and Statistics for Data Sciences

This course seeks to present the participants with the fundamentals of probability and statistics. As a segment in the data sciences module, the primary goal of this course is to present content which will serve as precursors for more advanced concepts in machine learning and statistics. The secondary goal is to provide the participants with the knowledge base to solve various real-world problems using the self-contained concepts taught at the end of this course. The course will be useful for participants who are exploring these topics for the first time, as well as those looking to bolster the fundamentals that they may have learnt in the past.

Instructor: Nandan Sudarsanam, IIT Madras

Eligibility

- At least 2 years of work experience.
- An undergraduate degree in any stream.

Admission

The programme follows a comprehensive admission procedure to ensure that the learners' goals are oriented towards a challenging experience, simultaneously achieving diversity in both technical and management aspects. Participants are carefully chosen through interview and online test.

Programme Fees

The programme fee for CTM is ₹ 5,00,000 + applicable Tax, payable in multiple instalments, as per the schedule indicated.

Limited scholarship may be provided to deserving candidates

Fees	Indians	International students	Deadline
On Confirmation	50,000	1000 USD	On accepting the offer
1st Instalment	2,00,000	3500 USD	15th June 2020
2nd Instalment	2,50,000	4500 USD	30th November 2020

Important Dates

Last Date of Registration	31st May 2020
Programme Commencement	July 2020

Programme Schedule

Activity	July-20	Aug-20	Sept-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21
Programme Launch	●											
Module Introduction	●			●			●			●		
Course Offer	●	●		●	●	●	●	●	●	●	●	
Webinar		●			●			●			●	
Campus Connect 1		●			●			●			●	
Campus Connect 2			●		●			●			●	
Final Exam			●			●	●			●		●

P D Jose
Professor IIM Bangalore

P D Jose is Professor of Corporate Strategy and Policy at IIM Bangalore. He is a fellow of IIM Ahmedabad. His research interests include strategy formulation and implementation, crisis management and organizational renewal, corporate sustainability and Corporate Social Responsibility.

Balaraman Ravindran
Professor IIT Madras

Balaraman Ravindran is a professor at the Department of Computer Science and Engineering, IIT Madras and the head of Robert Bosch Center for Data Science and Artificial Intelligence at IIT Madras. He is a PhD in Computer Science from University of Massachusetts and currently pursues his research in broader areas of Machine Learning.

ABOUT IITM - CCE

The Centre for Continuing Education (CCE) at IITM coordinates the continuing education programmes of the Institute. The Education Technology Cell, established by MHRD for the purpose of creating educational videos and other software of broadcast quality in Science and Technology using the expertise of the faculty and the facilities at IIT, is associated with this Centre. Further, the Centre facilitates continuing education modules for industry and IIT Madras series in Science and Engineering.

ABOUT IITM - RBCDSAI

The Robert Bosch Centre for Data Science and Artificial Intelligence (RBC-DSAI) was founded in August 2017, in IIT Madras with a vision to expand and further the research, education and outreach activities in the areas of Data Science and Artificial Intelligence. RBC-DSAI comprises faculty from several departments across the Institute, who carry out research in various areas of data science and artificial intelligence. The long-term vision of RBC-DSAI is to become a world leader in data science research, where long-standing fundamental research problems, cutting across disciplines, are targeted and solved.

ABOUT IIMBx

IIMBx is founded on the philosophy that management education has strong potential to transform by limitations imposed by location, finances or prior educational background. The vision of the IIMBx programme is to use digital learning to enable widespread access to management education. Led by the faculty at IIM Bangalore, IIMBx offers online courses and programmes covering core and advanced business and management subjects.

IIMB's VISION

To be a global, renowned academic institution fostering excellence in management, innovation and entrepreneurship for business, government and society

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