About the VAC

The objective of this course is to establish a robust mathematical foundation for comprehending and implementing the principles of machine learning. We will delve into the fundamental mathematical concepts that are essential for machine learning, including linear algebra, calculus, and graph theory. Additionally, we will cover specific topics like eigenvalues and eigenvectors, gradient descent, Classification Problems, Clustering, Neural Network, and more.

You will have the opportunity to visualize the concepts of machine learning algorithms and gain hands-on experience in their implementation using Python. By the end of this course, you will have a thorough understanding of the mathematical principles that underlie machine learning, enabling you to solve real-world problems with confidence.

What do we cover in the VAC?

1. Matrices, Vector Spaces

   Matrices – Basic properties; Row-echelon form - Invertiblity; Matrices as linear transformations; Similarity; Eigenvalues and Eigenvectors - Support Vector machine (SVM) - Perceptron; Single layer and Multilayer Neural Network
2. Inner Product Space

   Dot products and inner products – the lengths and angles of vectors – Gram-Schmidt orthogonalisation – Least Square solutions - Principle component analysis (PCA)
3. Calculus

   Basic concepts of Calculus – gradient – Jacobian – Chain rule – Change of variables – Maxima and Minima of two variable function – constraint maxima and minima - Lagrangian Multiplier method – Gradient Descent Algorithm
4. Probability and Random Variables

   Probability – The axioms of probability – Conditional probability – Baye's theorem – Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions - Clustering: density based clustering, k-means clustering
5. Regression

   Correlation and Regression – Partial and Multiple correlation – Linear and Multiple Regression - Logistic Regression – Practical Examples of regressions
6. Graphs and Networks

   Graphs – Adjacency and Incidence Matrix – Tree – Properties - distance and centres in Trees - Binary Tree – Binary Search Tree – Tree Traversals – Decision Tree

Resource Persons

(in alphabetical order)

Dr. David Maxim Gururaj, SAS, VIT, Chennai

Dr. David Raj Micheal, SAS, VIT, Chennai

Dr. Dhanasekar S, SAS, VIT, Chennai

Dr. Felix A, SAS, VIT, Chennai

Dr. Jayagopal R, SAS, VIT, Chennai

Dr. Jeganathan L, SCOPE, VIT, Chennai

Dr. Kalyan Banerjee, SAS, VIT, Chennai

Dr. Kalyani Desikan, SAS, VIT, Chennai

Dr. Manivannan A, SAS, VIT, Chennai

Dr. Manju G, SCOPE, VIT, Chennai

Dr. Pankaj Shukla, SAS, VIT, Chennai

Dr. Parthiban V, SAS, VIT, Chennai

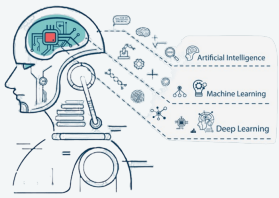
Dr. Saraswathi D, SCOPE, VIT, Chennai

Dr. Sethukumarasamy K, SAS, VIT, Chennai

Dr. Umity Srinivasa Rao, SCOPE, VIT, Chennai

Dr. Vanchinathan V, SAS, VIT, Chennai

Dr. Velmathi G, SENSE, VIT, Chennai

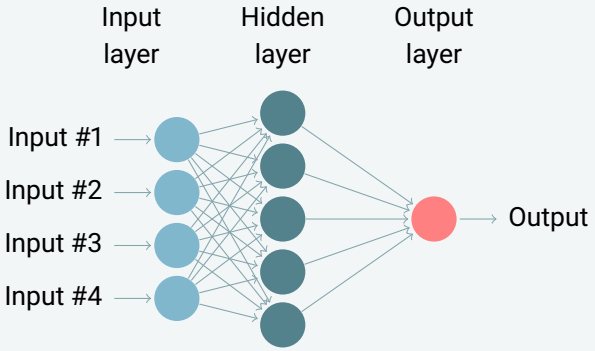


VIT®
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

Value Added Course
on

Mathematics for Machine Learning

May 15 – June 15, 2023
(30 hours)



Organised by
Division of Mathematics
School of Advanced Sciences (SAS)
Vellore Institute of Technology, Chennai, INDIA

VIT – A Place to Learn; A Chance to Grow

About VIT

VIT has made a mark in the field of higher education in India imparting quality education in a multi-cultural ambience, intertwined with extensive application-oriented research. VIT was established with the aim of providing quality higher education at par with institutions of international standards. It persistently seeks and adopts innovative methods to improve the quality of higher education in all fields of science and technology. VIT was established by the well-known educationalist and former parliamentarian, honorable Dr. G. Viswanathan, the Founder and Chancellor, a visionary who transformed VIT into a Centre of excellence in higher technical education. VIT is ranked among the top 601-700 universities of the world and one among the top 3 institutions in India (Shangai ARWU Ranking 2022). It is ranked the 9th best university and 10th best research institution and the 12th best engineering institution in India (NIRF ranking, Govt. of India 2022). Engineering and technology subjects areas of VIT are the 240th best in the world and 9th best in India as per QS university rankings by Subject 2023. It is ranked within the top 175 universities in Asia (QS – Asia University rankings 2022) and has got A++ in the 4th cycle of NAAC accreditation.

VIT, Chennai

VIT Chennai is a globally engaged, competitive, comprehensive and research-enriched university campus strategically positioned in the capital city of Tamil Nadu, to respond to major industrial, social, economic and environmental demands and challenges. VIT Chennai is ably spearheaded by Vice Presidents, Mr. Sankar Viswanathan, Dr. Sekar Viswanathan, Mr. G.V. Selvam, Assistant Vice President Ms. Kadhambari S. Viswanathan, Vice Chancellor Dr. Rambabu Kodali, and Pro Vice Chancellor Dr. V.S. Kanchana Bhaaskaran. They share in the mission to make VIT a global center. The focus is to:

- Maximize the Industrial Connectivity.
- Create Centers of Excellence in niche areas of research.
- Enrich Technological and Managerial Human Capital nurtured in a multicultural ambience.
- Provide a common platform for the agglomeration of ideas of personnel from various walks of life for enriched learning.
- Foster International collaborations for mutual benefits in areas of research.

About the School

The School of Advanced Sciences (SAS) at VIT Chennai comprises Divisions of Mathematics, Physics and Chemistry. It offers Ph.D. in Physics, Chemistry, Mathematics, Geology, M.Sc. in Physics, Chemistry, Data Science and B.Sc. Mathematics & Computing along with a plethora of core and elective courses facilitating B.Tech., M.Tech., MCA, Management and Law programmes.

- ☑ Ph.D. - Physics/Chemistry/Mathematics/Geology
- ☑ M.Sc. - Physics/Chemistry/Data Science
- ☑ B.Sc. Mathematics & Computing

Registration

Interested participants must register and make the payment at https://vitchennaievents.com/ by selecting the event

"Select Club → VAP → Math for ML".

Registration Fee: **₹ 150**

Last Date for Registration: **May 15, 2023**

Convenors

Dr. Velmathi G, Dr. David Raj Micheal & Dr. Felix A

velmathi.g@vit.ac.in
felix.a@vit.ac.in
davidraj.micheal@vit.ac.in
+91 86084 60768; +91 75028 78908