

# Bachelor of Science Program in Digital Science and Technology (Thai Program)

Academic Year 2026 – 2030

Faculty of Information and Communication Technology, Mahidol University

## Course Description

### (2) Data Science Courses

Number of credits (Theory – Practice – Self Study)

**ITDS 340 Machine Learning for Data Science 3 (3 – 0 – 6)**

Prerequisite: ITDS 253 Fundamentals of Data Science

Co-requisite: None

Fundamental concepts and techniques of machine learning; searching methods; solving problems by solution searching; symbolic computation; expert systems; uncertainty handling in the expert systems; intelligent systems; computational intelligence techniques; fuzzy logic; neural networks; genetic algorithms; case studies of the machine learning application; hands-on experience with industry-standard programming tools and frameworks

**ITDS 342 Advanced Mathematics and Statistics for Data Science 3 (3 – 0 – 6)**

Prerequisite: ITDS 253 Fundamentals of Data Science

Co-requisite: None

A review of calculus; differentiation; integration; linear algebra; matrix algebra; vectors and matrices; geometry of matrices and derivatives: linear transformations and partial derivatives; descriptive statistics: data and data presentation, measures of location and variability; probability theory; probability distributions; sampling distributions; statistical significance; tests of hypothesis; analysis of variance; linear regression and correlation; algorithms for the data analysis: classification and clustering

**ITDS 346 Practical Data Science 3 (0 – 6 – 3)**

Prerequisite: ITDS 253 Fundamentals of Data Science

Co-requisite: None

Data science projects based on actual industrial problems, which requires approval from advisors; writing project reports; presenting data science projects

**ITDS 347 Data Analytics and Business Intelligence 3 (3 – 0 – 6)**

Prerequisite: ITDS 253 Fundamentals of Data Science

Co-requisite: None

Concepts, components and architecture of the decision support systems (DSS) and business intelligent (BI) systems; decision theories; decision models; data warehouses and the knowledge management; exploratory data analysis; data extraction, transformation, and loading (ETL); data visualization and dashboard design; analyzing and solving problems by modeling, simulation and optimization; identifying and utilizing appropriate algorithmic techniques to solve relevant business problems such as targeted advertising campaigns, the fraud identification, the loan prediction, and the inventory optimization; the insight information presentation using the data visualization and data storytelling methodologies; key performance indicator design; data-driven insights; real-world business case studies; business intelligence tools; hands-on experience with industry-standard programming tools and frameworks

**ITDS 348 Deep Learning 3 (3 – 0 – 6)**

Prerequisite: ITDS 253 Fundamentals of Data Science

Co-requisite: None

A comprehensive introduction to neural networks (NN) and deep learning, covering key concepts such as backpropagation, multi-layer neural networks (MLNN), multi-layer hidden nodes, and optimization techniques; deep learning applications in computer vision (CV) and natural language processing (NLP), including tasks such as image classification, object detection, sentiment analysis, text classification, and language generation; cross-industry applications in finance, e-commerce, healthcare, automotive, and entertainment, with real-world case studies on fraud detection, predictive analytics, and customer experience automation; hands-on experience using industry-standard programming tools and frameworks to develop, optimize, and enhance deep learning models

**ITDS 349 Special Topic in Data Science 3 (3 – 0 – 6)**

Prerequisite: ITDS 253 Fundamentals of Data Science

Co-requisite: None

Recent advanced knowledge and techniques in data science; practical deployment of data science; other related topics that can be varied depending on the interests of faculties and students

**ITDS 384 Data Engineering and Infrastructure 3 (3 – 0 – 6)**

Prerequisite: ITDS 253 Fundamentals of Data Science

Co-requisite: None

Fundamentals of the big data infrastructure for continuous data analytics; design, development, testing, and maintenance of big data architectures; distributed the database clustering system, and the large-scale data processing system; using big data technologies such as Mapreduce and Apache Spark to address big data problems; hands-on experience with industry-standard programming tools and frameworks

**ITDS 385 Computer Vision for Industry****3 (3 – 0 – 6)**

Prerequisite: ITDS 253 Fundamentals of Data Science

Co-requisite: None

Fundamentals of computer vision and image formation; Programming tools and environments for image processing; Image display techniques and visualization; Basic image processing operations and filters; Geometric transformations and image warping; Image enhancement and restoration methods; Image segmentation algorithms and boundary detection; Feature extraction, representation, and description; Object recognition and detection systems; Image compression and efficient storage; Color image processing and analysis; Deep learning approaches to computer vision tasks; Neural networks for image classification; Modern object detection frameworks; Semantic and instance segmentation techniques; hands-on experience with industry-standard software tools and programming frameworks