

DATA SCIENCES, B.S. (INFORMATION SCIENCES AND TECHNOLOGY)

Begin Campus: Any Penn State Campus

End Campus: University Park

Program Learning Objectives

- **Knowledge/Application:** Understand the technical fundamentals of data sciences, with a focus on developing the knowledge and skills needed to manage and analyze large-scale, unstructured data to solve problems in our world.
 - Understand the synergy of statistical concepts/methods and computational/machine learning methods in discovering the structure of predictive models.
 - Understand and apply the technical fundamentals for data modeling to manage massive data (both structured and unstructured data).
 - Understand and apply the technical fundamentals of machine learning for generating predictive models and applying them to the analysis of large-scale data sets.
- **Problem-Solving & Evaluation:** Understand, apply, adapt, and evaluate hypothesis-driven and exploratory data analysis strategies, using relevant domain knowledge and abstraction methods.
 - Identify, construct, and incorporate relevant abstraction and domain knowledge (of an application discipline) into problem formulation and the design of predictive modeling.
 - Construct, evaluate, and choose data-enabled predictive models using state-of-the-art machine learning, statistical modeling, and model evaluation methods to reduce the risk of overfitting.
 - Data-enabled design of models that leverage scalable computing infrastructures to meet the desired needs of exploratory data analysis for massive and complex data.
 - Design analytic models by integrating data of multiple modalities and from different sources to achieve synergy for the purpose of improved prediction and facilitating discovery.
 - Design and implement integrated data-enabled models that provide insights and/or enable solutions for high-impact problems in the real world.
- **Communication (Individual and Team):** Communicate and work effectively (both individually and in teams) with multiple stakeholders using state-of-the-art visual analytic tools.
 - Formulate insights from data analytic results and communicate these insights effectively (both individually and in teams) with a range of stake holders using suitable visualization methods and tools.
 - Participate effectively on teams in order to accomplish the common goals of a data analytic project.
- **Data Ethics:** Understand the professional responsibilities in terms of the ethical, legal, security, and privacy issues regarding data-driven exploration and solution development.
 - Understand the importance and the best practice for protecting sensitive data; understand the issues regarding biases, fairness, and reproducibility throughout the life cycle of a data science

project, their implications, and possible ways to address these and other issues related to data ethics.

- **Curiosity-Driven Learning:** Commit to a passion for discovery that advances the knowledge of humanity toward a better world.