# SPORT DATA ANALYTICS (ADVANCED CERTIFICATE)

**Program Director:**

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The Advanced Certificate in Sport Data Analytics is a specialized, fully online program designed for professionals seeking to enhance their skills in applying data analytics within the sports industry. Focusing primarily on sports performance analytics and sports betting analytics, the program equips students with the expertise to analyze and optimize performance while maintaining ethical standards in data use and decision-making. This 12-credit curriculum offers a comprehensive foundation in data manipulation, analysis, and visualization to support data-driven strategies in sports.

## Admissions Requirements

- Students from any undergraduate major are welcome to apply, as long as they have acquired a bachelor's degree prior to the start of classes.
- Cumulative GPA of 2.8 or higher.
- Successful completion of an introductory statistics course (e.g., MAT 131, MAT 141, DAT 211, or equivalent) is required to ensure readiness for advanced analytical coursework.
- Students may apply at any time. We have rolling admissions.
- Student preparation and background are used to determine if some foundation courses may be waived.

### Materials to be Submitted

- Online Application (https://www.canisius.edu/admissions/apply-canisius/), with personal statement
- An official transcript from each college attended
- Resumé
- Official GRE or GMAT score (optional)
- Letters of Recommendations (optional)

## Policies

### Academic Standing

The Sport Data Analytics program follows the College of Arts and Sciences on students' academic standing. (http://catalog.canisius.edu/graduate/academics/academic-policies/#academicstandingtext)

### Matriculation and Continued Program Enrollment

The Sport Data Analytics program follows the Canisius University policy for matriculated students (http://catalog.canisius.edu/graduate/admission-matriculation/#Matriculation) that expects students to maintain a continuous program of academic work.

### Registration and Credit Hours

Sport Data Analytics students must be registered for at least 4.5 credits per semester to maintain eligibility for financial aid (if they are eligible). A full load is at least 9 credit hours. No student may register for more than 12 credit hours in any semester.

## Curriculum

| Code | Title | Credits |
|---|---|---|
| DAT 511 | Data Stewardship: Preparation, Exploration and Handling of Big Data | 3 |
| DSA 515 | Advanced Data Visualization in Sports | 3 |
| DSA 520 | Sport Performance Analytics | 3 |
| DSA 525 | Sports Betting Analytics | 3 |
| **Total Credits** | | **12** |

## Learning Goals and Objectives

Upon successful completion of the Advanced Certificate in Sport Data Analytics, students will be able to:

1. **Apply Advanced Data Analytics in Sports Contexts**
   Utilize statistical methods, machine learning techniques, and data visualization tools to analyze and interpret sports performance and betting data.
2. **Create Effective Data Visualizations**
   Design and develop interactive, insightful visualizations and dashboards using R and Tableau to support data-driven decision-making in sports organizations.
3. **Analyze Sports Performance Data**
   Evaluate player and team performance metrics using real-world data, including player tracking and biomechanical data, to inform training, strategy, and injury prevention.
4. **Build Predictive Models for Sports Outcomes**
   Develop and assess predictive models for forecasting sports events and betting outcomes, with attention to accuracy, interpretability, and practical application.
5. **Demonstrate Ethical Data Practices**
   Identify and apply ethical standards in sports data analytics, including responsible data use, privacy considerations, and fair decision-making practices.
6. **Communicate Data-Driven Insights Effectively**
   Present complex analytical findings clearly and persuasively to diverse stakeholders, including coaches, analysts, management, and betting professionals.
7. **Integrate Multiple Data Sources for Strategic Analysis**
   Combine and manage varied sports-related datasets to create comprehensive analytical solutions that address real-world challenges in the sports industry.

# Courses

**DAT 511 Data Stewardship: Preparation, Exploration and Handling of Big Data** **3 Credits**

This course introduces students to foundational and practical skills in data stewardship, with an emphasis on reproducible research and programming in R. Students will explore the data analysis process from data acquisition and cleaning to transformation, visualization, and documentation. Topics include tidy data principles, exploratory data analysis, clustering techniques, and the ethical handling of data. Students will gain hands-on experience using R and RStudio to manage large and complex datasets, utilize packages like dplyr and data.table, and produce publication-ready reports with R Markdown. The course also incorporates version control through Git and GitHub to promote collaborative and transparent workflows.
**Prerequisite:** CSC 511 or CSC 111.
**Offered:** every fall & spring.

**DSA 515 Advanced Data Visualization in Sports** **3 Credits**

This course explores advanced data visualization techniques specific to sports analytics, focusing on using R and Tableau. Students will learn to create interactive dashboards, employ visual storytelling, and effectively communicate insights from complex datasets. The course emphasizes creating compelling visualizations that aid in data-driven decision-making in sports.
**Prerequisite:** DAT 511 (may be taken concurrently), Basic knowledge of statistics and data analysis.
**Offered:** every fall.

**DSA 520 Sport Performance Analytics** **3 Credits**

This course delves into the application of statistical and machine learning techniques to analyze sports performance data. Students will learn to collect, process, and analyze various forms of performance data, including player tracking, biomechanics, and game statistics. The course emphasizes practical applications for optimizing individual and team performance, utilizing real-world data and case studies, with a focus on using R and Tableau for analysis and visualization.
**Prerequisite:** DAT 511 and DSA 515.
**Offered:** every spring.

**DSA 525 Sports Betting Analytics** **3 Credits**

This course explores the application of data analytics in sports betting, focusing on statistical analysis, predictive modeling, and risk management. Students will learn to collect, process, and analyze betting data, develop models for predicting outcomes, and understand the intricacies of the sports betting market. The course emphasizes practical applications using R and Tableau, preparing students to make data-driven decisions in the sports betting industry.
**Prerequisite:** DAT 511 and DAS 515.
**Offered:** every spring.