Sports and Exercise Analytics (SPRT)

Program Director: Paula E. Papanek, Ph.D.
Sports and Exercise Analytics website (https://www.marquette.edu/grad/programs-graduate-sports-exercise-data-analytics.php)

Degree Offered

Master of Science

Program Description

The sports and exercise analytics (SPRT) master's degree is offered through the program in exercise science, within the Department of Physical Therapy. This degree provides a synergistic intersection between exercise physiology (EXPH), computer science (COSC) and mathematical and statistical sciences (MSSC) utilizing the existing data science (DTSC) core of 15 credits. Graduates of the sports and exercise analytics master of science program will have the analytic skills to develop new applications and interfaces for large and complex sport and human performance datasets combined with foundational knowledge in exercise/sport physiology by which to aid in the interpretation and translation of the results to consumers, end users and clients.

LEARNING OUTCOMES

Upon completion of the master of science in sports and exercise analytics (SPRT), a student will be able to:

1. Articulate changes, trends and implications using analytics tools that can be ethically addressed across data platforms.
2. Design and implement strategies for analyzing data using appropriate methods, tools and datasets.
3. Analyze data to create actionable information, and use it to establish priorities, make decisions and solve problems aligning with the ethics, needs and values of individuals, communities and stakeholders.
4. Display and explain the results of analytics projects using effective written, graphic and verbal tools and techniques.
5. Use advanced data processing tools incorporating regulatory, data governance, master data management, data profiling, parallel and distributed processing best practices.
6. Manage data analytics projects and teams throughout the analytics lifecycle.
7. Interpret and translate sports and exercise performance data for targeted consumers (private, public).

PREREQUISITES FOR ADMISSION

1. Earned baccalaureate degree in any field with a minimum GPA of 3.000.
2. Information systems (coding/programming) competency (COSC 1010 Introduction to Software Development), or successful completion of the Coding Bootcamp that is offered by the Department of Computer Science, or an equivalent taken elsewhere.
3. Proficiency in foundational undergraduate or graduate statistics class that includes descriptive statistics, validity, reliability, power analysis, parametric and non-parametric analysis, general linear model (predictive models with continuous outcomes), with emphasis on appropriate data analysis of study design, level of measurement, and interpretation of results (MATH 1700 Modern Elementary Statistics, PSYC 2001 Psychological Measurements and Statistics or MATH 4720 Statistical Methods).
4. Foundational undergraduate or graduate courses in human performance including either a combined survey of anatomy and physiology course (minimum 4 cr.); a two-semester anatomy and physiology sequence (minimum 3 cr. each); or separate anatomy and physiology courses (3 cr. each); plus an exercise physiology course. A course in either biomechanics or kinesiology is strongly recommended.

APPLICATION DEADLINE

Applications for this program will be evaluated on a rolling basis.

Application requirements

Applicants must submit the following materials:

1. A completed application form and fee online (http://marquette.edu/grad/future_apply.shtml).
2. Copies of all college/university transcripts except Marquette.[1]
3. A statement of purpose.
4. Two letters of recommendation (at least one academic reference).
5. Resume or curriculum vitae.
6. GRE scores are required for any non-Marquette University graduate applying to the program. GRE scores are not required for Marquette University students or graduates unless their degree GPA is below 3.000.

7. (For international applicants only) a minimum acceptable score on the iBT TOEFL exam of 90 overall, with minimum section scores of 25 for listening and speaking, and minimum scores of 20 for reading and writing, or other acceptable proof of English proficiency.

[1]   Upon admission, final official transcripts from all previously attended colleges/universities, with certified English translations if original language is not English, must be submitted to the Graduate School within the first five weeks of the term of admission or a hold preventing registration for future terms will be placed on the student's record.

Academic Standards

A cumulative GPA of 3.000 is required in the sports and exercise analytics program. The Academic Regulations section of this bulletin describes the criteria and procedures for academic warnings, probation, removal of probation and dismissal. The sports and exercise analytics program strictly follows these policies and procedures.

Sports and Exercise Analytics Master's Requirements

The master of science in sports and exercise analytics requires a minimum of 33 credit hours. If a student is admitted with prerequisite deficiencies, completion of prerequisite courses does not apply toward master degree requirements. The program of course work and research is determined in consultation with the student's adviser.

Thesis OPTION (Plan A)

The master's student in Plan A must complete the required courses in data science (15 credits), the required courses in human performance/exercise physiology (12 credits) and 6 credits of thesis, for a total of 33 credits.

Non-Thesis OPTION (Plan B)

The master's student in Plan B must complete the required courses in data science (15 credits), the required courses in human performance/exercise physiology plus electives (15 credits) and 3 credits of project, for a total of 33 credits.

Required Course Work for Plan A and Plan B

Data Science Courses		
COSC 5500	Advanced Data Science	3
COSC 5820	Ethical and Social Implications of Data	3
COSC 6510	Business Intelligence	3
COSC 6520	Business Analytics [1]	3
or COSC 6540	Data Analytics	
COSC 6570	Data at Scale [2]	3
or COSC 6060	Parallel and Distributed Systems	
or COSC 6380	Advanced Database Systems	
Human Performance/Exercise Physiology Courses		
EXPH 5192	Advanced Exercise Physiology	3
EXRS 6960	Seminar in Exercise and Rehabilitation Science (taken once)	0
SPRT 6110	Advanced Applied Biomechanics in Injury Prevention and Performance	3
SPRT 6190	Advanced Strength and Conditioning: Data Analytics	3
SPRT 6958	Readings and Research in Sports and Exercise Analytics (taken once)	0
Plan A (Thesis) or Plan B (Non-thesis) - refer to requirements below.		9
Total Credit Hours		33

[1]   COSC 6540 recommended for students with a programming background
[2]   COSC 6060 or COSC 6380 recommended for students with a computer science background

Additional Course Requirements Plan A (Thesis)

Elective		3
SPRT 6999	Master's Thesis	6
Total Credit Hours		9

Additional Course Requirements Plan B (non-Thesis)

Electives - approved EXPH/EXRS/MSSC/COSC courses at 5000 level or higher		6
SPRT 6600	Project Design and Development in Sports and Exercise Analytics	1

SPRT 6998	Professional Project in Sport and Exercise Analytics	2
Total Credit Hours		9

MASTER'S DEGREE WITH THE DATA SCIENCE CERTIFICATE

The Department of Computer Science offers a data science certificate. If a sports and exercise analytics master's student chooses to also earn the certificate, admission to both programs may be concurrent. The same courses may be used to satisfy the requirements of the master's program and certificate, as outlined in the university bulletin for each program. Students are expected to be admitted into all programs they intend to complete, although course work completed prior to admission may be allowed to apply toward program requirements. Certificates must be approved individually via the curriculum approval process as Title IV aid eligible in order for students in any of these programs to be eligible to apply for federal financial aid.

Details on the data science certificate can be found in this bulletin.

Courses

SPRT 6110. Advanced Applied Biomechanics in Injury Prevention and Performance. 3 cr. hrs.
In-depth study of advanced biomechanical applications that are used to prevent injuries and improve performance. Major emphases are the critical evaluation of scientific and evidence-based literature along with an in-depth understanding of current biomechanical laboratory techniques. Prereq: Admitted to graduate EXRS or SPRT program.

SPRT 6190. Advanced Strength and Conditioning: Data Analytics. 3 cr. hrs.
In-depth exposure into the role and use of data analytics in the field of strength and conditioning. Emphasis is placed on the analysis, interpretation and communication of data in ways that are meaningful and actionable by practitioners. Prereq: Admitted to graduate EXRS or SPRT program.

SPRT 6600. Project Design and Development in Sports and Exercise Analytics. 1 cr. hr.
Provides mentorship in the design and development of the non-thesis master's project to include selecting the topic, population, community or site for project, design of methods and developing the agreements or contracts for the project. S/U grade assessment. Prereq: SPRT 6958.

SPRT 6931. Topics in Sports and Exercise Analytics. 1-3 cr. hrs.
Topics are presented that are not a part of the regular course work but are taught because of a special need, interest or opportunity. The number of hours is arranged according to specific circumstances and credits. Exposure to various topics, techniques and methods are presented by experts in the topic. May be taken more than once when topics vary. Prereq: Cons. of grad. prog. dir.

SPRT 6958. Readings and Research in Sports and Exercise Analytics. 0 cr. hrs.
Introduces readings and ongoing research in individual laboratories of faculty within the SPRT program. The number of hours varies, but the rotation typically consists of two rotations. Involves laboratory work, attending laboratory meetings, individual meetings with laboratory PI and oral presentation of progress made in this rotation. Directs students toward potential laboratories with interest or expertise as identified by the student in areas related to sport and exercise analytics. Students select their research mentor and collaborators for their project by the end of the course. SNC/UNC grade assessment. Prereq: Admitted to graduate SPRT program.

SPRT 6995. Independent Study in Sports and Exercise Analytics. 1-3 cr. hrs.
Independent study under the direction of faculty. Prereq: Cons. of instr.

SPRT 6998. Professional Project in Sport and Exercise Analytics. 1-2 cr. hrs.
Required course for the non-thesis option in Sport and Exercise Analytics. The final output of the course is a presentation of a completed project that meets project director's approval. S/U grade assessment. Prereq: SPRT 6600.

SPRT 6999. Master's Thesis. 1-6 cr. hrs.
S/U grade assessment.