DSA

Student 2022-

Handbook 2023

#### This handbook is designed to help students fulfill their responsibilities and make steady progress toward completion of a Data Science and Analytics Master of Science (DSA-MS) or **Multidisciplinary Studies Master of Science Data Science and Analytics Track** at SUNY Buffalo State. These requirements and procedures have been established by the graduate faculty of the DSA program, acting within guidelines set by the Graduate School. Students should consult the [Graduate Catalog](http://ecatalog.buffalostate.edu/graduate/) in effect when they entered the graduate program for other policies that may be applicable. Graduate degree programs are characterized by the high level of initiative that is expected of graduate students in meeting program requirements and completing their research.

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# Overview of the DSA Program

The M.S. in DSA degree is designed for those who desire advanced knowledge of applied skills in data science and analytics. It prepares students for research positions, professional employment, and/or study at the Ph.D. level.

## Mission Statement

### The mission of the Data Science and Analytics program is to enrich Buffalo State College and the surrounding communities by providing opportunities to acquire data analytics literacy which affects every field, ready or not. To fulfill our mission, we focus on the following strategic areas:

**Student experience:** Data Science and Analytics allows students to be leaders, disruptors, and influencers in the ongoing global information revolution. We support students through scholarship, research, professional development, networking, and mentoring. As a Professional Science Masters (PSM) affiliated program, we implement PSM foundational principles (internship experience, networking opportunities with an Industry Advisory Board, and business foundations) which better prepares our students to be successful professionals in their field of study. Our programs and pathways (the DSA MS, the DSA Advanced Certificate, the DSA 4+1 pathway, and undergraduate DSA courses) fulfill a variety of student's educational needs. Our students excel by assuming responsibility for their work, being attentive and prepared for their courses, managing their time efficiently, and having intellectual curiosity.

**Faculty and Staff Support:**The Data Science and Analytics program, part of the Interdisciplinary Unit in Data Science and Analytics (IUDSA), provides resources for faculty and staff to enable research, scholarship, practice, consulting, instruction, and professional development. Our faculty, informed by the Industry Advisory Board members, share their expertise and excitement for the field through their teaching, mentoring, and networking opportunities, providing students with opportunities to grow inside and outside the classroom.

* A list of our faculty and staff can be found in our [directory](https://dataanalytics.buffalostate.edu/directory).
* List of DSA courses can be found [here](https://dataanalytics.buffalostate.edu/course-descriptions).

**Industry Advisory Board:**The Data Science and Analytics program maintains an Industry Advisory Board comprised of local professionals representing a variety of industry sectors that a) provides curriculum related input that is up-to-date and aligned with industry needs and trends b) helps prepare students for immediate contribution upon employment c) builds a network for our students that provides information about internships and job opportunities, and d) grows and markets the DSA program and data science in the community. We provide Industry Advisory Board members with recognition for their efforts, opportunities to network with faculty, students, fellow board colleagues and other members of the Western New York area data science community as well as access to talented interns and potential employees who are well prepared to join the data science workforce.

* For information about our Industry Advisory Board members and the work that they do check out our [Industry Advisory Board page](https://dataanalytics.buffalostate.edu/industry-advisory-board).

**Diversity and Inclusion:** The Data Science and Analytics program is dedicated to creating and sustaining a diverse educational environment. Our efforts include strategic initiatives to recruit, support, and retain students, faculty, and staff from all backgrounds and perspectives. We advocate for policies that enhance educational equity and address inequity for all (our industry advisory board members, students, potential students, faculty, staff, and contributors). Our learning community welcomes diversity in every form. We believe these governing principles promote excellence and enrich the experience for everyone involved with the DSA program at Buffalo State and in the surrounding communities.

**Visibility:** The DSA program supports the mission of Buffalo State College. As a representative of Buffalo State, we are a resource for the local community by promoting interest in data science and improving the quality of professionals in the field.

## PSM

The DSA program is a Professional Science Master’s (PSM) affiliated program. A PSM program combines coursework in the Science, Technology, Engineering, and Math (STEM) disciplines with courses designed to develop professional workplace skills, such as project management, communication strategies, leadership, and ethics (PLUS courses). PSM programs also require an applied, hands-on internship. All affiliated programs must have an active and engaged Industry Advisory Board of leaders from industry, business, government, and/or non-profit organizations. Industry Advisory Board members serve based on their direct industry connections and ability to provide insight on the skill sets and tools that are most needed in the industry. Members of the Industry Advisory Board have also committed to assisting with internship positions, attending networking events, aiding in job placement of graduates, and providing input on the curriculum.

* For information about our Industry Advisory Board members and the work that they do check out our [Industry Advisory Board page](https://dataanalytics.buffalostate.edu/industry-advisory-board).

### **Data Science and Analytics Experiential Learning (DSA 688) – Internship & Professional lab**

The DSA Capstone course has 2 components; internship and professional lab. The internship acquaints students with specialized resources of various external organizations and assists student in understanding the nature of employment activities in offices/agencies that employ data scientists. The professional lab provides students an opportunity to apply skills and knowledge gained in the classroom to actual problems and tasks while still in an academic environment.

### **PLUS courses**

PLUS courses are professional-skills based courses (e.g., project management and business/technical communication) that are taken in addition to DSA required courses which address topics in computer science and programming, statistical analysis, and computational tools. These PLUS courses provide students with skills to be successful in a variety of business settings.

# Overview of the M.S. in DSA Degree

The M.S. in DSA degree is designed for those who desire advanced knowledge of applied skills in data science and analytics. It prepares students for research positions, professional employment, and/or study at the Ph.D. level.

## Graduation Requirements:

* 6 credits Computer Science courses
* 6 credits Mathematics and Statistics courses
* 3 credits in plus course
* 12 credits in electives
* 3 credits experiential learning
* C or better grade in all required courses
* Overall cumulative GPA of 3.0 or higher

**Course Offerings**

For a list of course descriptions [click here](https://dataanalytics.buffalostate.edu/course-descriptions).

**Required Mathematics and Statistics courses:**

* MAT 616 Elements of Mathematics for Data Science (3 credits): Fall & Spring
* MAT 646 Introduction to Statistics for Data Science (3 credits): Fall & Spring

**Required CIS Courses:**

* CIS 512 Introduction to Data Science and Analytics (3 credits): Fall
* CIS 600 Machine Learning for Data Science (3 credits): Fall

**Required Plus Course**

* SPF 689 Methods and Techniques of educational research

**Required Experiential Learning**

* DSA 688 Experiential Learning (3 credits): Fall & Spring

**Sample list of Electives (12 credits):**

* DSA 501 Data Oriented Computing (3 credits): Summer
* DSA 650 Data Strategy and Governance (3 credits): Spring
* GEG 584 Geospatial Programming (3 credits): Spring and Summer
* PSM 601 Project Management for Math and Science professionals (3 credits): Fall
* Additional electives by advisement ([See website](https://dataanalytics.buffalostate.edu/course-descriptions))

## Sample Course Rotation:

Additional sample course rotations can be found on the [website](https://dataanalytics.buffalostate.edu/ms-course-roadmap).

|  |  |
| --- | --- |
| Semester  (Summer 1) | DSA 501 (3-credit course) |
| Semester  (Fall 1) | CIS 512  MAT 616  PSM 601  Begin looking for internship opportunities  Attend seminar series |
| Semester  (Spring 1) | MAT 646  DSA 650  GEG 584  Apply for internship opportunities  Attend seminar series  Complete Professional Lab |
| Semester  (Fall 2) | CIS 600  DSA 688  Elective  Attend seminar series  Apply for graduation  Complete Internship |

## DSA M.S. Student Learning Outcomes

Student learning outcomes (SLOs) are statements which specify knowledge, skills, abilities or attitudes that students are expected to attain by the end of the DSA MS program.

1. DSA graduates will be able to select and apply an appropriate statistical, mathematical or computational model for a given quandary.
2. DSA graduates will be able to acquire data from data scraping and open sources and understand the ethical and legal ramifications of data acquisition.
3. DSA graduates will be able to store, clean, organize, and manipulate real world data from multiple sources.
4. DSA graduates will be able to compose and present an effective oral, written report or dynamic dashboard, to a lay audience (including storytelling and data visualization) that enhances the audience’s understanding and reveals properties of the data.
5. DSA graduates will be able to use the appropriate software or programming application (Python, SQL, SAS, SPSS, Excel) to manage and analyze data.
6. DSA graduates will be able to perform effectively as a member of a team to execute a project and will understand what contributes to team success.
7. DSA graduates will be able to integrate context specific information into their data manipulation allowing them the flexibility to interpret data from many different environments

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# Overview of the DSA Advanced Certificate

The Graduate Certificate in DSA is designed to serve the advanced educational needs of professionals with a bachelor’s degree who require modern skills for manipulation and organization of their industry data. The certificate program consists of 12 credit hours and is designed to equip graduates with essential data analytics skills and competencies to be effective and competitive in today’s data-driven work environments.

## Advanced Certificate Graduation Requirements:

* DSA 501 Data Oriented Programming (3 credits)
* DSA 650 Data Strategy and Governance (3 credits)
* CIS 512 Introduction to Data Science and Analytics (3 credits)
* MAT 646 Introduction to Statistics for Data Science (3 credits)

The graduate certificate program in DSA may be applied toward a DSA Master’s degree at SUNY Buffalo State.

## DSA Advanced Certificate Student Learning Outcomes

1. DSA graduates will be able to understand basic data sources and analytical approaches in data science and analytics (i.e., differentiate analytical techniques and algorithm implementations; recognize fundamental concepts and tools used in identification of “big data” problems, for risk assessments, and for quality assurance models, etc.).
2. DSA graduates will be able to describe the data lifecycle and practices for the design of proper data usage and governance.
3. DSA graduates will be able to analyze and solve data-oriented problems using mathematics, statistics, and probability concepts.
4. DSA graduates will be able to examine and apply programming tools to identify data sources, anomalies, analytical approaches, and to construct algorithmic implementation for application to real-world problems.

# Overview of the Data Management and Storytelling Micro-credential

The Data Management & Storytelling micro-credential enhances skills and competencies in data-driven storytelling through the use of interactive visual delivery models. Many professionals understand the importance of data in decision making, but few are equipped to detect stories within the data and how to present data effectively.  This micro-credential will provide professionals from multiple industries foundational knowledge and technical skills to manage and analyze data, identify patterns within datasets, and effectively communicate those stories through more interactive visual models.

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## Data Management and Storytelling Micro-credential Graduation Requirements:

* DSA 610 - Databases and the Data Science Information Life Cycle (3 credits, DSA students only)
* HEA 730: Data Visualization & Storytelling (3 credits)

# DSA 688 Experiential Learning

## Internship

DSA faculty and staff assist in the coordination of the student’s internship, but it is ultimately the student’s responsibility to obtain an internship position.

Required seminars are a great way to learn about different career paths and build your network, make sure you are taking advantage of this opportunity to meet and talk to experts in the data science and analytics field. A study done by LinkedIn in 2016 showed that 70% of people were hired by a company where they already had a connection. Building your network throughout your entire time in the program will help you get an internship and find a job after graduation.

Students may also look for internships using the Buffalo State Career Development Center (CDC) BengalLink (<https://buffalostate-csm.symplicity.com/students/?signin_tab=0>), as well as the DSA website: <https://dataanalytics.buffalostate.edu/internship>.

### Internship Opportunities

The Buffalo State DSA program has partnered with Roswell Park Comprehensive Cancer Center and the Buffalo State Biology Department to create an opportunity for students to learn genomic data science. Interested students who have the appropriate biology background will complete an internship at Roswell Park and will have the opportunity to take genomics focused electives.

The DSA program has also partnered with the Industrial Technology Department at Buffalo State to create an opportunity for students to learn about clean energy analytics. Interested students who have the appropriate engineering background will complete an internship with the industrial technology department or an approved partner and will have the opportunity to take clean energy focused electives.

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## Professional Lab

In addition to the internship, students are expected to participate in a Professional Lab. A Professional Lab is a project where a group of students work together to find creative solutions for a concern from a business. These projects allow students to build their portfolio while working in an academic setting.

By engaging students in opportunities that integrate knowledge and experience, experiential learning fosters an understanding and life-long appreciation for learning. Students engage in a process that includes preparation, action, and reflection to develop the habits of mind required to learn effectively from experience and the commitment to put knowledge into action as responsible global citizens.

Additional information about professional labs can be found on the DSA website, <https://dataanalytics.buffalostate.edu/professional-labs>

## Seminar

All MS students are expected to attend ALL the seminars each semester. Seminars are announced to students via email and calendar invites. The seminar schedule is also available on the [DSA website](https://dataanalytics.buffalostate.edu/seminar-series).

You can make up for missing seminars by watching the seminar recording which is available on the [DSA YouTube channel](https://www.youtube.com/channel/UCQi_0hCIGD01uSTBJOmbQog) and the [DSA website](https://dataanalytics.buffalostate.edu/watch-previous-seminars) then pick one of the items from the list below and send Heather Campbell ([campbehm@buffalostate.edu](mailto:campbehm@buffalostate.edu)) your response:

* What was one part of the presentation that you agreed or disagreed with? Write a paragraph about your understanding of the topic and why it differs or agrees with the presenter’s.
* Imagine you were going to meet with the presenter. What discussion provoking questions would you ask about their job or presentation (minimum of 4 questions)? Next, send them a connection invite on LinkedIn, introduce yourself, say you listened to their presentation and ask at least one of your questions. Send your 4 questions and a screenshot of your LinkedIn message to Heather.
* What is one topic that the presenter touched on that you are interested in? Read 1 additional article on this topic and summarize it. Send your summary and link to the article to Heather.

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# Professionalism

DSA is a “Professional” Science Master’s program, and we expect professionalism from our faculty, staff, and students alike. This includes interactions on and off campus. Professionalism is following through on each commitment and organizational role in a way that exceeds the expectations of others. It is being positive, action-oriented, opened-minded, poised, adaptable, respectful, self-regulated, empathic, organized, prepared, and collaborative. Professionals perform effectively in teams and communicate effectively to individuals and groups through various means. They have special expertise and contribute to a range of challenging disciplinary areas. Life-long learning and self-growth are valued, practiced, and mentored in others. They take care with appearance, language, and productive behaviors to create an image of success. Professionals encourage and support environments that produce trust by demonstrating integrity through ethical and inclusive decision-making.

**Professionals are:**

* **Accountable:** by taking full responsibility before, during, and after each effort or decision; they share credit for positive results with others, and readily accept consequences when things don't go as expected.
* **Reliable:** because they can be counted on doing quality work within the allotted time by committing necessary resources while at the same time they are ready to help others in need.
* **Self-assessors**: who set criteria for each performance, make key observations; reflect and analyze on these observations, behaviors and actions; and consistently make improvements without being prompted by others.
* **Self-aware:** understanding the implications of their behaviors and actions on others and adapting appropriately for each changing situation.
* **Self-motivators:** who are energetic, passionate, and invested.
* **Risk-takers:** who achieve success by taking informed chances or alternative approaches and are willing to accept temporary failure and push-back so long as it is in the best interest of the project or activity.
* **Experts:** who actively advance disciplinary and interdisciplinary knowledge with every learning opportunity by remaining current on relevant innovations, methodologies, and practices in their own and related areas of expertise.
* **Communicators:** who effectively express informally and formally through a range of modes and refined interpersonal skills their expertise, expectations, and means to both large groups and individuals.
* **Ethical:** by placing a high and consistent focus on aligning decisions and actions with quality individual, disciplinary, and organizational values.
* **Presentable:** by representing themselves in a manner that is above reproach at all times in their appropriate dress, language, and behaviors

# Graduation

## Satisfactory Degree Progress

Satisfactory progress toward completion of your degree requires you to maintain a cumulative GPA of >3.0 (B) on a 4-point scale, earning no grade < C for any graduate course, as well as the items outlined above for the M.S. degrees. Should a student fall below a 3.0 in their coursework, they will have 1 semester (if full time) or until 9 credits are completed if part-time, to bring their cumulative GPA up to a 3.0. Students must also obtain at least a 3.0 in every semester in which they are attempting to bring their cumulative GPA up to the required 3.0. Failure to obtain at least a 3.0 in each semester or failure to reach the cumulative 3.0 in one semester (or 9 credits if part-time) are grounds for dismissal.

## Checklist of M.S. Graduation Requirements

* Completion of 30 credits of graduate work, but no more than 36 credits, with a cumulative GPA of ≥ 3.0.
* Identification of internship site location and supervisor.
* Completion of DSA 690 duties and expectations
* Completion of Graduation Application by Graduate School deadline:<http://graduateschool.buffalostate.edu/forms>

# The Lighter Side

Graduate school is an important steppingstone in your career and a time of great academic learning and freedom. You will undertake a wide variety of specialized courses, read many research papers, and undertake an internship that is entirely your own. You should value the time that you think long and hard about specific questions and ponder how best to investigate them. You will be challenged in many new ways and, hopefully, will develop a surprising level of commitment and pride in your academic accomplishments. You will join a group of graduate students who are motivated by similar questions and experiences and who also ‘thirst’ for knowledge on their topic. That similarity in purpose leads to further scientific interaction as you practice seminars, discuss papers, take classes, or work together. Your time invested during this important stage in your life will help build your peer family here at SUNY Buffalo State and help guide your future decisions. Although the DSA program expects high quality learning and research from its students, you should also have fun while you are here. Upon completion you will enter the ranks of valued graduate alumni, so please keep us informed of your success. Good Luck!

# Stay connected

Follow the DSA program on LinkedIn <https://www.linkedin.com/school/buffalo-state-data-science-and-analytics-dsa/>

* Event reminders
* Student and faculty achievements
* Data science community events
* Announcements

Join the private student group on LinkedIn, search Buffalo State DSA and PACM Students and request to join the group

* Job and internship posting
* Interview techniques
* Event reminders
* Place to connect with fellow students