Michigan Technological University

Data Science Graduate Program
Student Handbook

Materials are created following Graduate School policies, with some text copied or adapted from the CEGE and ECE handbooks.

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Welcome!

Welcome to the Data Science Graduate Program at Michigan Technological University. The Data Science graduate program is an interdisciplinary program, meaning the faculty and courses for the program coming from all the Colleges across the University. In 2021-2022, the program moved to have a home unit in the Computer Science department (part of the College of Computing). Note, the program remains interdisciplinary by design with students taking courses across the university.

The degree you seek will be challenging and give you opportunities to learn new skills, practices, and knowledge. The skills and knowledge will be the building blocks of starting a path of lifelong learning in the field of Data Science.

The program is a course-based degree, but you will get involved in many hands-on, real-world activities and projects in these courses.

I encourage you all to interact with all your fellow students and faculty. Stretch yourself and work with different students; you will have many opportunities to work in teams, reach up and pair with new students building both your technical skills and team-work and professional skills in the process. This is an opportunity to start building your professional network.

The faculty and staff are here to help you succeed. Ask questions, reach out for help. Don't wait until the end of the semester if you need assistance.

This handbook is provided as a document to answer your basic questions. For more information, please refer to the data science website and reach out to your advisor or Data Science director.

We wish you great success in the Data Science Graduate Program.

Sincerely,

Laura E. Brown
Graduate Program Director
Data Science MS Program

Sherry Wyeth
Graduate Program Assistant and Advisor
Data Science MS Program

Program Governance

The Data Science program is managed by an inter-disciplinary community of scholars and professional staff working together to support this program. Some of the key personnel include:

Dr. Laura E. Brown - Data Science Program Director
Home Department, College: Computer Science, College of Computing
Office: Rekhi 307, lebrown@mtu.edu

Dr. Benjamin Ong - Data Science Executive Committee
Home Department, College: Mathematical Sciences, College of Sciences and Arts
Office: Fisher 217, ongbw@mtu.edu

Dr. Guy Hembroff - Data Science Executive Committee
Home Department, College: Applied Computing, College of Computing
Director: Health Informatics Graduate Program
Office: EERC 311, hembroff@mtu.edu

Dr. Jeffrey Wall - Data Science Executive Committee
Home Department, College: College of Business
Office: AOB G010, jdwall@mtu.edu

Dr. Hairong Wei - Data Science Executive Committee
Home Department, College: College of Forest Resources and Environmental Science
Office: Noblet 176, hairong@mtu.edu

Dr. Jianhui Yue - Data Science Executive Committee
Home Department, College: Computer Science, College of Computing
Office: Rekhi 203, jyue@mtu.edu

Ms. Sherry Wyeth - Data Science Graduate Program Assistant and Advisor
Office: Rekhi 226, swyeth@mtu.edu

Most inquiries can be directed towards Ms. Wyeth or Dr. Brown. E-mail is the preferred mode of communication.

Graduate Student Government (http://gsg.mtu.edu)

Data Science Representatives: Gilbert Kennedy, Kepha Barasa Barasa, and Joseph Chibuike Nwokeafor

They will communicate information regarding travel grants, social activities, opportunities and other important information. They can also be used as a contact to communicate suggestions, complaints, and help to answer questions.

1. Data Science Graduate Programs

The M.S. in Data Science is a coursework-based degree program offered by the Department of Computer Science. The Department of Computer Science offers several graduate programs including:

- Graduate Certificates:
  - Data Science Foundations. This certificate is offered on-campus in Houghton, MI.
- Master of Science of Applied Computer Science. This program is offered to students on-campus in Houghton, MI.
- Master of Science in Computer Science. This program is offered to students on-campus in Houghton, MI.
- Master of Science in Cybersecurity. This program is offered to students online or on-campus in Houghton, MI.
- Master of Science in Data Science. This program is offered to students on-campus in Houghton, MI.
- Doctor of Philosophy in Computer Science. This program is offered to students on-campus in Houghton, MI.

Other graduate certificate programs that may be of interest to Data Science MS students are:

- Applied Statistics. This certificate is offered to students online or on-campus in Houghton, MI.
- Artificial Intelligence in Healthcare. This certificate is offered to students online or on-campus in Houghton, MI.
- Foundations of Health Informatics. This certificate is offered to students online or on-campus in Houghton, MI.
- Security and Privacy in Healthcare. This certificate is offered to students online or on-campus in Houghton, MI.

1.1 Department Structure

It is the mission of the Computer Science Department to "prepare students to learn, discover, innovate, and apply new knowledge in computer science through a balanced program of cutting-edge research, effective teaching, and outreach and service."

CS Department Chair: Dr. Zhenlin Wang, zlwang@mtu.edu, Rekhi 322
Data Science Graduate Program Director: Dr. Laura Brown, lebrown@mtu.edu, Rekhi 227

Department Staff

Department Coordinator: Janna Chittick, zyesmukh@mtu.edu, Rekhi 322
Graduate Program Assistant and Advisor: Sherry Wyeth, swyeth@mtu.edu, Rekhi 226

1.2 Keys, Desks, Computers & Research Space Assignments

The M.S. in Data Science is a coursework-based degree program. Therefore, students are not assigned office spaces. A student's HuskyCard will grant after-hours admission to spaces in Rekhi Hall.

All students are required to have a HuskyCard for identification and swipe access to buildings, parking lots, and residence halls if applicable. HuskyCards are issued at the HuskyCard Service Center in the IT Service Center, 1st floor of the Van Pelt and Opie Library. A valid government-issued photo ID is required, such as a driver's license, a state ID or a passport.

Students working on research projects may be issued keys or card swipe access to project laboratories upon approval of the faculty member responsible for that laboratory and upon completion of all required safety training.

Keys or ID cards must not be passed on to anyone else, or duplicated, under ANY circumstances. Lending or duplication of keys is grounds for dismissal. Lost keys or ID cards need to be reported to supervisors as soon as they are noticed to be missing. A $100 fee is assessed for any key lost/replaced or not returned to public safety when no longer needed or when the student has graduated.

All graduate students are provided computer access through computer labs in several common areas (Rekhi 112, 113, and 117) as well as campus labs. Questions and problems with computers should be directed to the Information Technology (IT) Help Desk, found on the first floor in the library or via email at it-help@mtu.edu. The IT staff will supply you with your username and password; change your password the first time you log into your account. Please read the policies for using computers as well as using any Michigan Tech computer facilities as soon as you begin using the computers.

Students should be aware of Michigan Tech's computer use policies and IT's standards regarding copyrights, privacy, passwords, and hacking.

1.3 Email and Printers

Email is the department's primary communication tool with graduate students regarding issues such as financial support, graduate program obligations and responsibilities, and semester timelines and deadlines, to name a few. You are expected to be responsive to departmental emails at all times.

Printing can be done at the HuskyPrint stations around campus.

1.4 Seminars

The CS Department offers seminars throughout the fall and spring semesters. Attendance is not required but is encouraged to be aware of current research topics. In particular, for those students interested in continuing their graduate studies, attendance at the seminars provides insights and access to potential research topics.

1.5 Responsible Conduct of Research

Responsible Conduct of Research (RCR) Training is an important aspect of being an effective scholar or practitioner; this training is mandatory.

Basic training must be completed within the first two semesters at MTU or a registration hold will be placed on the student's account. Basic RCR training may be completed via an online course.

1.6 Continuous Enrollment and Residency Requirements

Continuous enrollment throughout the academic year (fall and spring semesters) is required through the semester in which students complete all degree requirements. Graduate students are not required to register for the summer session. This means students who wish to remain active in the graduate program must be enrolled every academic fall and spring semester from their first enrollment through their final semester in (a) regular courses including independent study, projects, co-ops, etc. or (b) one of three courses (UN 5951, UN 5952, or UN 5953). Contact the Graduate School regarding these courses. Please note that tuition for these courses may not be waived and these courses may not be paid from departmental or sponsored accounts.

Students who do not maintain active status enrollment (through one or more of the course options above) will have to apply for readmission to regain active status. Students may request a waiver of continuous enrollment. However, waivers of continuous enrollment will be strictly limited to one term except in the most serious situations. For more information, contact the Graduate School.

The Graduate School has set out residency requirements for the Master of Science.

1.7 Grades

Students can gauge their coursework progress using the following explanation of letter grades.

Letter Grade	***Rating***
A	Excellent and good graduate work
AB	Acceptable graduate work
B	Marginally acceptable graduate work
BC	Unacceptable graduate work
C	Unacceptable graduate work (all requirements completed)
F	Unacceptable graduate work (all requirements not completed)

According to the Graduate School, graduate students must maintain at least a 3.0 cumulative grade-point average in the courses required for a graduate degree. No credit is given for courses in which students receive CD, D, or F grades. A maximum of six (6) credits can be used for your degree with a BC or C grade.

Students who receive a CD, D, or F in required courses must retake the courses to fulfill the requirements. Students who receive a CD, D, or F in other courses selected to fulfill requirements may elect to retake the course or take a different course to fulfill the requirement.

1.8 Student Standing

To be in good standing, Master's students must maintain a minimum GPA of 3.0 and make reasonable progress toward the degree. Students receiving BC, C, or lower grades should meet with their advisor. If students are not in good standing at the end of the semester, they will receive an email from the Graduate School. Students should make an appointment with the Graduate Program Director to determine paths forward to complete their degree.

1.9 Academic Probation

Probationary status is reviewed at the end of each semester by the Graduate School to determine if the student may stay enrolled in the program. The Graduate School initiates academic probation and dismissal procedures. The Graduate Program Director and the graduate advisor will respond to Graduate School requests. As noted above, students should make an appointment with the Graduate Program Director to determine appropriate paths forward with respect to their degree.

1.10 Grievance Procedure

Defining Grievance Cause

Faculty or students with concerns or complaints about the behavior of other faculty or students in professional situations or in interpersonal relationships should follow the grievance procedures described below. Note that questions of plagiarism should be taken to the Office of Academic and Community Conduct, and sexual discrimination and sexual harassment issues should be taken to the University Title IX Coordinator.

General Guidelines for Grievances

Faculty and students should avoid discussing their complaints with colleagues. Faculty or students who believe they have been subjected to discrimination based on sex or sexual harassment, suspect that an unfounded discrimination complaint may be filed against them, or have been threatened with the filing of such a complaint should notify the Affirmative Action Officer as soon as possible.

Student-Initiated Grievances

Students have the right to fair and equal treatment by administrators and to expect professional behavior from faculty and other students. Professional behavior includes such matters as a respect for expertise, individual beliefs, and personal privacy.

Students should be aware that the campus provides an ombudsperson. One of the functions of the ombudsperson is to process student complaints.

Students wishing to appeal a grade assigned by a faculty member at Michigan Tech should follow the procedure described in the Michigan Tech Policy Statement under Academic Grievances.

Title IX

Title IX of the Education Amendments of 1972 is a Federal civil rights law that prohibits discrimination on the basis of sex in educational programs and activities that receive Federal funds. It states:

> "No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance."

Under Title IX, discrimination on the basis of sex can include gender discrimination, pregnant and parenting discrimination, sexual harassment or sexual violence, such as rape, dating violence, domestic violence, stalking, sexual assault, sexual battery, and sexual coercion.

To officially report an incident of gender discrimination, sexual harassment, or sexual assault/violence, you may contact the Title IX Coordinator at titleix@mtu.edu, 906-487-3310, 306 Administration Building or Public Safety and Police Services at 906-487-2216. If you are a student, you may also choose to report to the Office of Academic and Community Conduct.

1.11 Voluntary Withdrawal

A student may elect to withdraw from the program. There are several different policies to consider when electing to make a withdrawal. Students should discuss withdrawal options with the Graduate Program Director and the Graduate School (gradschool@mtu.edu).

1.12 Dismissal

Students may be dismissed from the program if a student fails to maintain good academic standing or does not make satisfactory progress toward a degree. The dismissal procedure is described by the Graduate School.

1.13 Safety

The CS Department expects all faculty, staff, and students to make safety a priority. As such, all graduate students must complete the University General Safety Training annually.

1.14 Absence Policy

Students receiving financial aid through the University (teaching assistantship, research

assistantship, and/or fellowship) are entitled to staff holidays. Please note that the breaks between academic terms and the break at Christmas are not automatically considered as holidays or time off. In the case of GRAs, excused absences must be arranged with the faculty advisor.

1.15 Academic Integrity

The University and the CS Department expects all students to maintain the highest level of academic and scientific integrity in all aspects of their studies, from class work to exams to research. If you are unsure of or have specific questions about assignments, projects, examinations, etc., please ASK your instructor or research advisor.

Academic integrity and honesty are central components of a student's education, and ethical conduct fostered in an academic context will be carried into a student's professional career. Academic integrity is essential in a community of scholars searching and learning to search for truth. Anything less than total commitment to integrity undermines the efforts of the academic community. Both students and faculty are responsible for upholding the academic integrity of the University. For more information about policies related to Academic Integrity, please visit the Office of Academic and Community Conduct.

1.16 Student Responsibility

It is the responsibility of each Data Science graduate student to be familiar with the Data Science program policies as outlined in this Handbook, and with Graduate School policies as outlined on the Graduate School website. It is the responsibility of each Data Science graduate student to be sure that forms are completed and authorized in a timely fashion. All forms are now collected online and may take up to 2 weeks for processing.

1.17 International Students

Upon arrival on campus, all international students are required to report to International Programs and Services (IPS), Administration Building, Room 200 if you haven't checked in already. Bring your I-20 or DS-2019, passport and visa.

All matters concerning employment practice, visa renewals, and related matters are handled through this office. Changes in I-20 forms are handled in the Graduate School.

In order to be visa compliant, international students must register as full-time students. Questions regarding I-20 forms, visa status, and full-time student status may be directed to the Graduate School.

1.18 Accommodation Policies for Americans with Disabilities

Michigan Tech complies with all federal and state laws and regulations regarding discrimination, including the Americans with Disability Act of 1990 (ADA). If any student has a disability and needs a reasonable accommodation for equal access to education or services at Michigan Tech, please call the Dean of Students Office, Coordinator for Student Disability Services (7-1494). For other concerns about discrimination, contact one's advisor, Department Chair, or the Affirmative Action Office (7-3310).

2. Financial Support

2.1 Procedure and Schedule for Awarding Support

The Data Science MS program is a coursework-only master's program, therefore graduate research assistantships (GRAs) are not available from the program. It may be possible for students to get involved in research projects, however any funding would be provided with the individual faculty's discretion.

Graduate teaching assistantships (GTAs) or graduate assistantships (GAs) are not available for students. There are a very limited number of grading positions available after your first semester. The grading positions do not cover full tuition costs with a stipend, but are usually some combination of hourly paid position and/or limited tuition support.

2.2 Types of Support

Teaching Assistantships

Graduate teaching assistants (GTAs) are not available for students. A typical GTA package includes tuition, fees, and a stipend. Stipends are adjusted periodically to ensure that they are competitive.

Research Assistantships

Graduate research assistants (GRAs) are provided by individual faculty's discretion. The stipend and benefits are the same as those for GTAs.

Graders

Grading positions are paid through some combination of hourly paid positions and/or limited tuition support. Open grader opportunities will be posted to students ahead of each semester. Graders will report to a course instructor on the requirements and expectations for a given course.

Other Funding

- King/Chavez/Parks Fellowship. The Michigan King/Chavez/Parks Fellowship program provides grants to support graduate education for students from under-represented groups.
- Summer Youth Programs. Students may find employment as counselors or instructors in various summer youth/outreach programs offered by the university.

2.3 Student Commitment to Contracts

Students who find they must resign their positions during the year should make every effort to inform the Graduate Program Director and the appropriate supervisor as soon as possible, but not less than four weeks prior to the beginning of the semester. If you are unable to keep up with the required work in a grader position, first reach out to your course instructor, then to the Graduate Program Director.

3. Advisors

3.1 Coursework MS Advisor

The Graduate Program Director, Dr. Laura Brown, is the default faculty advisor for all entering M.S. in Data Science students. Entering students prepare for the first-semester by providing a course plan and other information to the Graduate Program Director and Graduate Program Assistant. Students may register for classes after consultation with their advisor, Graduate Program Director, and Graduate Program Assistant.

Data Science graduate students will have an opportunity to select a co-advisor that matches their interest/domain background if they desire. Co-advisors should typically be selected based on which domain electives you intend to specialize in. For example, if you intend to mostly take courses offered by the Math department as your domain electives, you should consider requesting Dr. Ong as your advisor.

Your advisor(s) should provide academic and career advising. Academic advising entails ensuring that your courses are suitable for your career goals and you have the necessary background to succeed in the courses. Career advising entails providing you a glimpse of what the industry in your domain specialization might look for in potential hires, connecting you with other researchers in their department/college, and potentially connecting you with recruiters.

3.2 Changing Advisors

Before initiating the process to change your graduate advisor, please consider all the options listed on the Graduate School's website for how to address difficulties in the student-advisor relationship.

Once you have decided to change your graduate advisor, you must follow the steps listed below.

1. Meet with your graduate program director to initiate the process to change advisors. If meeting with the graduate program director is not feasible or appropriate, meet with the chair or college dean of the department or college. If you are in an interdisciplinary program, you may meet with the chair or school dean of your administrative home department or college.
2. Discuss the following with the graduate program director (or chair/college dean) and, if appropriate, the current advisor:
    a. Whether additional resources within or outside the academic unit (such as the Ombuds office) could help resolve the situation.
    b. The impact of the change of advisor on your time to complete the degree. Coursework, qualifying exam(s), and the research proposal examination are all factors that could be impacted with a change in advisor.
    c. Impact on immigration status (if any). Consult International Programs and Services (IPS), if necessary.
    d. Record the agreement from the discussions in writing, including indications of agreement from all affected faculty advisors, and provide copies to the student, the graduate program director, and all affected faculty advisors.
3. File an updated Advisor and Committee Recommendation Form for approval by the Graduate School.

4. If the student and the graduate program director are unable to reach agreement on the advisor change, contact the assistant dean of the Graduate School to determine additional steps to resolve the situation.

4. Graduate Degree Requirements

4.1 Master of Science

The Data Science Masters is a course-based program requiring successful completion of 30 approved credits within five years of starting the program. Specifically,

- 12 credits of core courses must be successfully completed
- at least 6 credits of approved electives must be successfully completed
- at most 6 credits of foundational courses may be taken
- 6 - 12 credits of domain specific electives may be taken.

A passing grade (B or higher) must be obtained in 24 of the above 30 credits; a grade of BC or C may be accepted for the remaining 6 of the 30 credits. Additionally, at least 18 credits must be taken at the graduate level (5xxx and 6xxx).

Core Courses

The following four courses are **required** for the Data Science degree. Some of these courses are offered only once a year. You will need to plan accordingly.

Fall, Spring	UN 5550‡	Introduction to Data Science
Fall	MA 5790†	Predictive Modeling
Fall, Spring	BA 5200	Information Systems Management and Data Analytics
Spring	CS 5831	Advanced Data Mining

Note, many students **do not need** to take all three core courses in their first semester. UN 5550, Introduction to Data Science is recommended for this first semester, but the choice of the other core course should be discussed with your advisor before the semester begins.

‡ Spring admissions are available; therefore, an additional offering of UN 5550 has been added to the Spring terms going forward, assuming minimum enrollment. Note, students are **highly encouraged to** enroll in UN 5550 their first semester - this course helps prepare you for other courses you may take.

† In Spring 2022, MA 5790 was offered due to high demand. Note, the spring offering may not be available all years going forward.

Electives

At least 2 courses, 6 credits, must be taken from the list of approved elective courses in Table 1. Note, the options have changed over the years, be sure to select courses given the year you entered the program.

Class offerings might change without notice. Please refer to the Registrar's schedule of classes for actual class offerings.

Table 1. List of Elective Courses

		Academic Year				
Course	**Course Offered**	**2020 - 2021**	**2021 - 2022**	**2022 - 2023**	**2023 - 2024**	**2024- 2025**
CS 5631 - Data Visualization	Fa, Sp	X	X	NA	NA	NA
CS 5841/EE 5841 - Machine Learning	Sp	X	X	X	X	X
CS 5471 - Computer Security	Fa, Sp	X	X	X	X	X
FW 5083 - Prog. Skills for Bioinformatics	Fa, alt. years	X	X	X	X	X
MA 4710 - Regression Analysis	Fa	X	X	X	X	X
MA 5770 - Bayesian Statistics	Fa, alt. years	X	X	X	X	X
MA 5781 - Time Series Analysis & Forecasting	Sp	X	X	X	X	X
MGT 4600 - Management of Tech. and Innov.	Fa, Sp	X	X	X	X	X
PSY 5210 - Adv. Stat. Analysis & Design I	Fa, alt. years	X	X	X	X	X
SAT 5114 - Introduction to AI and Health	Fa	X	X	X	X	X
UN 5390 - Scientific Computing	Fa, Sp	X	X	X	X	X

Foundational Courses

A maximum of six (6) credit hours of foundational skills course may be applied to the MS in Data Science. These courses will build skills necessary for successful completion of the MS in Data Science.

Some students will not need to take these foundational courses and will instead use the domain electives to reach the credit requirements of this program.

A list of foundational courses that can be taken towards the data science program is listed on the data science website and in Table 2.

Domain Elective Courses

Appendix A contains an extensive list of domain elective courses that can be taken towards the data science program. Your remaining credits of domain elective courses, 6-12 credits, can be taken towards the data science degree.

Note: If there is a course not on the Domain Elective Course list, a student may petition the Graduate Program Director for its consideration. This petition must be submitted before the start of the semester for consideration.

Table 2. List of Foundational Courses

Course	Course Offered
CS 3425 - Introduction to Database Systems	Fall, Spring
FW 3540 - Introduction to Geographic Information Systems for Natural Resource Management	Spring
MA 3710 - Engineering Statistics	Fall, Spring, Summer
MA 3715 - Biostatistics	Spring
MA 3740 - Statistical Programming and Analysis	Fall, Spring
MIS 3100 - Business Database Management	Fall
SAT 3210 - Database Management	Fall
SAT 3611 - Infrastructure Service Administration and Security	Fall
SAT 4560 - Introduction to Applied Computing in Python Programming	Fall, Spring

Internships / Co-ops

Internships and co-ops can provide valuable experience to your data science degree, in addition to expanding your network for future job prospects. To participate in a co-op, students must have a cumulative GPA of 3.0 or above, and adhere to deadlines posted. International students should contact IPS and review information on the co-op website to ensure that requirements of their visas are fulfilled (e.g., students must have completed two full time semesters in residence at Michigan Tech).

** Only internships and co-ops that are relevant to your data-science program may be counted towards the academic fulfillment of your data science degree. Students who wish to count co-op experience towards the academic fulfillment of the data science degree should provide the offer letter / job description to the program director for prior approval. If approved, up to three (3) credits of Co-op (UN 5000/ UN 5001 / UN 5002) can be counted towards academic fulfillment of the data science degree as a domain specialization elective.

Policies for Repeating Courses

For the data science degree, up to six (6) credits may be accepted with a BC or C grade. Overall a 3.0 GPA must always be maintained, failure to do so will result in academic probation.

Required courses can only be repeated once. If a student fails to earn a passing grade in a required course after taking the required course twice, the student will be recommended for dismissal from the program. This policy applies even when the course is repeated at another institution.

Forms and Degree Completion Timelines

An important resource is the Graduate School's Forms and Deadlines webpage. It is the student's responsibility to complete forms and training courses in a timely fashion. Failure to meet submission

deadlines could result in delayed completion of a student's graduate degree. NOTE: graduate students must maintain a university cumulative GPA of 3.0 or above to be eligible for graduation.

It is the responsibility of each Data Science graduate student to be sure that forms are completed and authorized in a timely fashion. All forms are now collected online and may take up to 2 weeks for processing.

6. Professional Development Opportunities and Support Services

6.1 Opportunities

Graduate Student Government

The Graduate Student Government (GSG) of Michigan Tech represents the professional, intellectual, and academic concerns of graduate students to the various governing bodies of the university and acts as an advocate for graduate students. GSG Representatives work with the CS Department Chair to provide programming for CS Graduate Students, faculty, and staff.

6.2 Support Services

Conflict Resolution

Occasional differences of opinion and interpersonal disagreements are an inevitable part of graduate school. Individuals have different goals, working styles, and personalities and because of this, conflict can occur. A conflict handled effectively is a learning opportunity that can result in creative solutions, benefiting students, faculty and the University.

Lack of clarity in expectations is often the cause of conflicts. Expectations should be clear and commonly understood by all parties; putting them in writing, if necessary, helps to clarify the situation. Students and advisors may find that using an Individual Development Plan, such as the MiTechIDP, can assist in the advisor/mentoring process.

There is a significant power differential in the student/advisor relationship, and conflict resolution requires that we acknowledge this fact and arrive at beneficial solutions.

Some conflicts require reporting to the appropriate office and following established University procedures. These include:

- Academic Grievance procedure for grading disputes
- Discriminatory harassment or treatment: Office of Institutional Equity
- Research misconduct
- Sexual or physical assault: University's Public Safety and Police Services (dial 9-1-1 or call 487-2216 for non-emergency situations).
- Violations of the Student Code of Conduct

If the conflict does not require review by a specific office, it is recommended to resolve them early. It is better to handle small issues as they arise and before they become major problems. There are often more options to resolve conflicts when an early resolution is sought. There are several avenues to resolve conflicts:

- informal resolution at the department/program level,
- advice and mediation by University Ombuds,
- advice or facilitated dialogue from the Conflict Resolution Network, or
- formal grievance processes.

People closest to the case are often in the best position to resolve the situation, so the first step should be at the lowest unit level, between the parties (student and faculty, student and staff, student and student) involved and an appropriate third party, if necessary (eg., advisor, other faculty, advisory committee members, graduate program director, lab supervisor, department chair). Resources are available to assist parties in resolving conflicts. Consult with the Ombuds, Office of Academic and Community Conduct, Conflict Resolution Network, or Institutional Equity for advice. Disagreements are varied and the people closest to the situation are in a position to consider the specific programmatic/departmental details and help resolve the issues. Thus, an amicable, quick informal resolution at the department/program level is the best course.

If a resolution cannot be reached at the lowest level, there are several avenues a student may consider. Working with the Ombuds is an independent and neutral way to obtain informal mediation services for conflict resolution. Mediation by the Ombuds is confidential; no written records are preserved. Facilitated dialogue or restorative justice may also be utilized; contact the Conflict Resolution Network to determine if their services may be appropriate. If informal means are unable to resolve the conflict, the Graduate Grievance policy may be appropriate.

The J.R. Van Pelt and Opie Library

Along with a growing collection of textual and electronic resources, the J. R. Van Pelt and Opie Library is connected to MELCAT & ILLIAD, so that students may retrieve sources from other institutions. The library also provides research and instructional support for all students. This modern and well-lit library has several group study rooms, computers, printing and photocopying areas, a buzzing café, University Archives and Historic records, and other amenities.

Career Placement

- Use the career center for help with interviews and resumes. In addition, you should plan on attending the Fall and Spring Career Fairs for finding internships and job leads.

- Students are strongly encouraged to create a Linkedin account and connect with the Michigan Tech Alumni Group. Social networking can be beneficial for expanding professional associations.

- Part-time on-campus employment opportunities for students may be available.

Campus Employment

International students ON-CAMPUS EMPLOYMENT

- International students must limit on-campus employment to 20 hours per week while school is in session. Students on J-1 visas must report on-campus employment to IPS.
- You cannot work off-campus without prior approval from IPS.
- You will need to apply for a Social Security Number if you have an on-campus job offer. Bring your job offer letter to IPS for further instructions.

Apply for a Social Security Number (SS# or SSN)

IPS has all the details on employment options. Before accepting any kind of job, contact IPS to find out if your visa allows you to work, and about other forms and requirements that may be required including applying for a Social Security Number. Please request a receipt confirming the SSN application, and return receipt to the graduate school, Admin 411, if you have been hired as a GTA/GRA/GA.

Payroll

GTA/GRA/Fellowship/grader awardees need to be set up on payroll as soon as possible to avoid a delay in pay. Pay disbursements are issued every two weeks. Direct deposit can be set up online in Banweb under Employees, Pay Information, Direct Deposit allocation.

Fellowship recipients are paid monthly as a non-payroll disbursement. Direct Deposit can be set up for non-payroll payments online in Banweb under Employees, Non-Payroll Direct Deposit Destination.

Student Billing

After scheduling courses, go to MyMichiganTech to receive a copy of your schedule and tuition bill. You may pay your student bill online with American Express, MasterCard or Discover (2.3% transaction fee applies) or e-check, or at the Cashier's Office located within the Student Financial Services Center in the Administration Building. Note: Credit/debit card payment not taken at Cashiers Office or by phone.

If you have not paid for your courses by Wednesday of the first week of classes, your courses will be dropped.

For supported students only (GTA/GA/GRA): After scheduling courses, go to Banweb to view a copy of your schedule and tuition bill. Computer fees and tuition for up to 9 credits per semester will be paid by the program for fully supported students. You are responsible for the student voted fees such as the Student Activity Fee, and Experience Tech Fee, etc.

Registration and Student Scheduling

The graduate course catalog is located on the Registrar's website. We recommend that your course schedule be determined in consultation with your advisor, data science director, or a member of the data science executive committee. It is important to set yourself up for success by ensuring that you have a suitable background to succeed in this interdisciplinary program. There are various foundational courses that can help strengthen your background in statistics, business, or computing. All students should take UN5550, Introduction to Data Science, in the first semester of their studies (unless they have insufficient programming background and may want to consider SAT 4560 - email Dr. Brown if you have questions on which is the best option for you).

Information about registration can be found at the Registrar's website. You may register online using the Banweb system or register in person at the Registrar's Office, Room 130 of the Administration Building. Courses can be dropped or added through the first week of class without accruing any late penalty.

Housing Information

- On-campus housing information
- Off-campus housing information

Parking & Transportation

See the Transportation Services website for detailed information regarding the vehicle registration process, parking fees, and rules/regulations regarding parking. Vehicle registration/parking permit purchase is available online. Bring your vehicle registration and your picture ID to Transportation Services, 100 Administration Building, to pick up your parking permit. During off-hours (4pm-7am weekdays) and all weekend, core campus parking lots and parking meters are open for parking (exception is handicap and designated parking spaces).

Winter Parking Rules

To allow for snow removal, parking is prohibited on campus between 2:00am and 7:00am, from November 1 through April 30 (regardless of if there is/isn't snow on the ground). Exceptions: Campus housing residents may park in their designated lots. Those needing to park on campus overnight can ask for and receive a special overnight parking permit from transportation services. If it is after 5 p.m. on weekdays, on a holiday, or on weekends, contact Public Safety and Police Services for parking permission. If you have car problems and are unable to move your vehicle, contact Transportation Services at 487-1441 during regular business hours (8am-5pm, Monday-Friday), and after hours, holidays, and weekends call Public Safety before the 2:00 a.m. deadline at 487-2216.

Shuttle Service

The University and local community offers multiple shuttle routes for access to campus, campus housing, and city shopping. Shuttle routes and times information is available.

7. University Policies

Here are some of the university policies that pertain to the data science program. A full listing of University policies is found online.

External Transfer Credits

To transfer credits from another university or college to the data science program, please be aware that :

- A maximum of ten transfer credits can be applied towards the Data Science degree unless special arrangements have been made between Michigan Tech and the second institution. The number of credits accepted depends on an evaluation by the Data Science program and the dean of the Graduate School.
- A grade equivalent of "B" or better must be earned in the course to be transferred.
- The proposed course to be transferred must be pre-approved by the Data Science Executive Committee before the end of the semester **prior** to the semester you intend to take the transfer course, and must be taken at an institution accredited by the Higher Learning Commission (HLC). The course cannot duplicate courses that have already been taken at Michigan Tech. The student will provide the name of the university, a course number, name, and description, and the **most recent** syllabus for the course. A Michigan Tech faculty member responsible for teaching the required course will be consulted as to whether the proposed course is of equivalent content.

Accelerated MS

The Accelerated Masters in Data Science program is open to all high achieving undergraduate students at Michigan Tech. It allows students to double count up to six credits toward both the Bachelor's and MS degree. Students with an overall GPA of 3.0 or higher can apply for admission to the accelerated MS in Data Science program any time upon attaining junior class standing, but must apply prior to being awarded their bachelor's degree.

Students should meet with the Data Science program director and their undergraduate advisor to plan what courses may be double-counted and allowed senior rule courses. All courses counted under the senior rule and all double-counted courses applied to the accelerated MS in Data Science degree must have a grade of B or higher.

Senior Rule

Michigan Tech undergraduates may take up to 10 Data-Science approved credits hours in their senior year, and use these credits towards a Data Science Masters degree. A grade of "B" or higher must be attained for these credits to count towards the graduate degree. Note, these credits do not count towards the undergraduate degree, and are independent of double-counted courses.

Senior rule courses require completion of a form by Week 2 of the course semester.

Re-using Credits

Students may double count up to 10 credits from one other Michigan Tech graduate program toward a Data Science masters degree, with the approval of the Data Science Program Director. Graduate credits earned toward the **completion** of a graduate degree at an institution other than Michigan Tech **cannot** be applied toward this degree program (this is a Michigan Tech policy).

8. Helpful Tips

Formatting Papers and Citing Research Material

All of your instructors expect you to properly cite and document sources of information in your work. Different instructors will prefer different formatting styles. Plagiarism is not tolerated and can result in dismissal from the graduate program. Be sure you are familiar with what constitutes a violation. When in doubt, please ASK your instructor or research advisor. A detailed booklet is available that describes Michigan Tech's academic integrity policy and procedures.

Skills and Research Methodology

Although the Data Science Graduate Program is course-based, there will be numerous opportunities to work with professors on current research projects. Take the initiative to engage with faculty in your area of interest. Volunteer to assist with research tasks outside of class, above and beyond class assignments. Learn the methodology being used by the researcher. Be aware that:

- Statistics and quantitative skills are critical for data scientists. Not only should you be able to use a variety of statistical tools, but you also need to be able to understand the theoretical meaning and be adept at interpreting the results in productive and insightful ways.
- Core courses will require familiarity with a number of advanced computer skills. Invest time developing a solid understanding of a computer programming language such as Python and R. This will allow you to carry out more complex data analyses.
- Writing/communication skills are *essential* to a successful career. Michigan Tech provides assistance to improve your professional writing/communication. You should treat each and every writing/communication assignment as an opportunity to improve your communication skills.

Appendix A: Domain Elective Courses

Biomedical Engineering

BE	5870	Computer Vision for Microscopic Images

Business and Economics

ACC	5200	Financial Statement Analysis
BA	5300	Financial Reporting and Control
BA	5610	Operations Management
BA	5650	Project Management
BA	5800	Marketing, Technology, and Globalization
EC	4200	Econometrics
EC	4400	Banking and Financial Institutions
FIN	3000	Principles of Finance
FIN	4200	Derivatives and Financial Engineering
MGT	3800	Innovation & Entrepreneurship
MIS	3200	Systems Analysis and Design
MIS	4000	Emerging Technologies
MIS	4400	Business Intelligence and Analytics
MIS	4990	Special Topics in Management Information Systems
MKT	3200	Consumer Behavior & Culture
MKT	3600	Marketing Data Analytics

Chemistry

CH	4610	Introduction to Polymer Science
CH	5410	Advanced Organic Chemistry: Reaction Mechanisms
CH	5420	Advanced Organic Chemistry: Synthesis
CH	5509	Transport and Transformation of Organic Pollutants
CH	5515	Atmospheric Chemistry
CH	5516	Aerosol and Cloud Chemistry
CH	5560	Computational Chemistry

Cognitive and Learning Sciences

PSY	5220	Advanced Statistical Analysis and Design II

Computer Science

CS	4425	Database Management System Design
CS	4471	Computer Security
CS	4811	Artificial Intelligence
CS	5321	Advanced Algorithms
CS	5331	Parallel Algorithms
CS	5441	Distributed Systems
CS	5760	Human-Computer Interactions and Usability Testing
CS	5811	Advanced Artificial Intelligence
CS	5821	Computational Intelligence

Electrical and Computer Engineering

EE	5500	Probability and Stochastic Processes
EE	5521	Detection and Estimation Theory
EE	5726	Wireless Sensor Networks
EE	5821	Computational Intelligence

Forest Resources and Environmental Science

FW	5084	Data Presentation and Visualization with R
FW	5411	Applied Data Analysis
FW	5412	Data Analysis in R
FW	5540	Remote Sensing of the Environment
FW	5550	Geographic Information Science and Spatial Analysis
FW	5555	Advanced GIS Concepts and Analysis
FW	5556	GIS Project Management
FW	5560	Digital Image Processing: A Remote Sensing Perspective

Geological and Mining Engineering and Sciences

GE	5150	Advanced Natural Hazards
GE	5195	Volcano Seismology
GE	5515	Advanced Geoinformatics
GE	5600	Advanced Reflection Seismology
GE	5870	Geostatistics & Data Analysis

Mathematical Sciences

MA	4330	Linear Algebra
MA	4720	Design and Analysis of Experiments
MA	5201	Combinatorial Algorithms
MA	5221	Graph Theory
MA	5627	Numerical Linear Algebra
MA	5630	Numerical Optimization
MA	5701	Statistical Methods
MA	5741	Multivariate Statistical Methods
MA	5750	Statistical Genetics
MA	5761	Computational Statistics
MA	5791	Categorical Data Analysis

Mechanical Engineering - Engineering Mechanics

MEEM	5010	Professional Engineering Communication

Physics

PH	4390	Computational Methods in Physics

Social Sciences

SS	5005	Introduction to Agent Based Modeling

Applied Computing

EET	4501	Applied Machine Learning
SAT	5001	Introduction to Medical Informatics
SAT	5141	Clinical Support Modeling
SAT	5165	Introduction to Big Data Analytics
SAT	5283	Information Governance and Risk Management
SAT	5314	Applied Machine Learning in Healthcare
SAT	5424	Population Health Informatics
SAT	5520	Machine Learning in Security
SU	5010	Geospatial Concepts, Technologies, and Data

Co-op

UN	5000	Graduate Cooperative Education I

Appendix B: Degree Schedule - Masters in Data Science

(A) Required Coursework - 12 credits

Semester	Course Number	Title	Credits	Grade
	UN 5550	Introduction to Data Science	3	
	MA 5790	Predictive Modeling	3	
	CS 5831	Data Mining	3	
	BA 5200	Information Systems Management	3	

(B) Elective Coursework - Minimum 6 credits

Semester	Course Number	Title	Credits	Grade

(C) Foundational Coursework - Maximum 6 Credits

Semester	Course Number	Title	Credits	Grade

(D) Domain Electives

Semester	Course Number	Title	Credits	Grade

Appendix C: COVID-19 Impacts

The whole world has seen the terrible impact of the Covid-19 pandemic on our friends, family, communities, countries, and world. Here at Michigan Tech we have had to adapt to the pandemic as well. The latest news, policies, and plans at Michigan Tech, are updated on the MTU Flex page.

For those who were studying during Spring 2020 and Track A Summer 2020, the following policies impact the program rules governing the program.

- Proposal 54-20 - **Good Academic Standing:** The Graduate School recognizes the additional stressors that graduate students are under due to disruptions caused by COVID-19 are many and are strong contributors to their ability to maintain or return to good academic standing in spring 2020.
    - Graduate students who are on probation after fall 2019 or who have been reinstated for spring 2020 following a suspension can return to good standing after spring 2020 if they satisfy the conditions of good standing as defined by Senate Policy 416.1.
    - Graduate students who are on probation after fall 2019 will not be suspended if they do not return to good standing in spring 2020 as defined by Senate Policy 416.1. These students will remain on probation for their next semester of registration.
    - Graduate students who are in good standing after fall 2019 will not be placed on probation if they do not meet the standards for good standing as defined by Senate Policy 416.1. These students will remain in good standing for their next semester of registration.
    - Graduate students who began at Michigan Tech in spring 2020 do not have an academic standing. These students will be in good standing after spring 2020 regardless of whether they meet the standards for good standing as defined by Senate Policy 416.1.
- Proposal 59-20 - **Pass / Low Pass grades:** Grades will be assigned using the normal grading scheme at the end of the semester. Graduate students will then have seven days after grades are posted to decide if they would like to switch any classes from spring 2020 to pass/fail grades (grades of SCV, LCV, or ECV). A pass grade (SCV) will be assigned for a grade of C or better. A low pass grade (LCV) will be assigned for grades of CD or D. A fail grade (ECV) will be assigned for a grade F. Once a graduate student elects the Pass/Fail option for a course and the final grade is changed, the decision is final and may not be reversed.
    - Considerations for SCV/LCV: The SCV and LCV grades will appear on your transcripts but not contribute to the cumulative GPA. SCV grades may satisfy graduation requirements (see below), but LCV grades can not.
- Proposal 60-20 - **BC/C and SCV grades:** The Graduate School and the Data Science program allows up to six credits of BC, C, or SCV grades to be used toward completion of a graduate degree. An additional three (3) credits of SCV may be allowed to count towards the degree requirements. Courses with an LCV grade will not meet degree requirements (e.g., completing a core or elective requirement), but will not negatively impact your cumulative GPA (like receiving a CD/D would). Recall, your degree completion requires a minimum cumulative GPA of 3.0.

For those who were studying during Fall 2020, the following policies impact the program.

- Proposal 30-21 - **Extend Time for Completion of Incomplete**: The time to complete an "I", incomplete grade is extended one year past the end of the course.
- Proposal 33-21 - **Change Date for Withdrawal with a "W"**: Students are allowed to withdraw from a course with a "W" until Friday, December 11th (extended from Friday, Nov. 6th).
- Proposal 37-21 - **Pass/Low Pass/ Fail for Fall 2020**: Grades are assigned using the normal grading process. Students will then have seven days to decide if they would like to switch any classes to Pass/Low Pass/Fail grading.
  Students should talk to their advisors and others on campus about the impact of this change: GPA, course credit, academic standing, degree requirements, financial aid, transfer credit, visas, and acceptance into graduate or professional schools.

Impacts of Covid-19 on Michigan Tech, will continue into the Spring 2021, pay attention to emails, town halls, the MTU Flex webpage, to learn of the most recent changes.