STA 363: Intro to Statistical Modeling

Spring 2026

Note: The instructor reserves the right to adjust this Syllabus throughout the course as necessary to enhance student learning. Any changes in the Syllabus and Course Calendar will be updated in this document and announced in the class and/or Canvas. Course materials provided to you, including presentations, tests, outlines, and similar materials, are copyright protected by the faculty member(s) teaching this course. You may make copies of course materials solely for your own use. You may not copy, reproduce, or electronically transmit any course materials to any person or company (such as Course Hero) for commercial or other purposes without the faculty member's express permission. Violation of this prohibition may subject the student to discipline/suspension/dismissal under Miami's Code of Student Conduct or Academic Integrity Policy.

Bulletin Description

Applications of statistics using regression and design of experiments techniques. Regression topics include simple linear regression, correlation, multiple regression and selection of the best model. Design topics include the completely randomized design, multiple comparisons, blocking, and factorials.

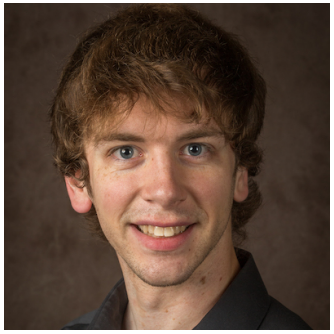
Prerequisites

An introductory statistics course: STA261, 301 or ISA 205, 225. STA 363 may NOT be taken after credit has been earned for STA 463/STA 563.

Section and Instructor Information

Section A: Mon & Wed 11:40am - 1:00pm (UPH 320 & 326)

- Instructor: **Dr. Michael O'Connell**
- Office: McVey Data Science Building (DSB) 352
- Email: oconnemj@miamioh.edu
- Office hours:
    - Mon 2-4pm, Tue 9:30-11:30am, or by appointment



Section B: Mon & Wed 1:15pm - 2:35pm (UPH 320 & 326)

- Instructor: **Ms. Lizzy Compton**
- Office: McVey Data Science Building (DSB) 358
- Email: comptom5@miamioh.edu
- Office hours:
    -
    - TR by appointment via Zoom

Section C: Tues & Thurs 8:30am - 9:50am (UPH 320 & 326)

- Instructor: **Dr. Thomas Fisher**
- Office: McVey Data Science Building (DSB) 348
- Email: *fishert4@miamioh.edu*
- Office hours:
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Class Associates

Previous STA 363 students will be serving as Undergraduate Associates (UA) this upcoming semester. Their primary responsibilities will be to assist students with in-class assignments.

If you enjoy STA 363 this semester and would be interested in serving as a UA in the future, please contact your instructor near the end of the semester to express your interest!

We will also have students from the Statistics' Master's program serving as Graduate Assistants (GA) this semester. The GAs will assist with in-class assignments as well as serve as graders for the course.

UAs for this semester:

- Section A:
- Section B:
- Section C:

GAs for this semester:

- Joey Truitt
- Simon Webster

Detailed Class Description

STA 363 has been designed to be an interactive course where you perform statistical analyses as they are performed in the real world. Beginning on day 1 you will be generating reports that perform statistical analysis. As the semester progresses and your computing skills develop, you will learn to embed an analysis with computer output in a well-formatted generated report.

In many ways the class has been designed as a *sneak peak* for the Data Science & Statistics major, while also providing students outside that major with the opportunity to learn how to perform some hands-on statistical analyses. The class includes introductory material that will later be covered in more detail in other upper-level statistics courses, including STA 404 (Advanced Data Visualization), STA 463 (Regression Analysis), STA 466 (Experimental Design Methods) and STA 467 (Statistical Learning).

Class Topics

The class covers the following topics that are designed to build upon one-another:

- **≈ 1-2 weeks:** Introduction to R, RStudio, RMarkdown; data handling and a review of Intro stat material.
- **≈ 3 weeks:** Experimental design topics, one-way ANOVA, two-way ANOVA, blocking, repeated measures and within-subjects designs.
- **≈ 3 weeks:** Multiple regression, models, inference, residual analysis, and related topics.
- **≈ 3 weeks:** Advanced regression ideas, model building, cross-validation.
- **≈ 3 weeks:** Statistical odds and their interpretation; logistic and Poisson regression.

Class Format

This class is designed to be very interactive, requiring regular student participation and preview of the textbook. The class is structured as 13 chapters, where we will complete approximately a chapter a week. The weeks are structured so that they build upon one another. Each week will consist of lectures, and in-class assignments.

The general structure of each module is given below.

- **Monday/Tuesday (class time):** Following a lecture introducing the topics, an in-class activity will be assigned. Group work is encouraged and may be required on some assignments. These in-class assignments are due at midnight with an 8-hour *grace* period.

- **Wednesday/Thursday(class time):** Similar to Monday, an activity will be assigned, due at midnight, with an 8-hour *grace* period.
- **Every other Friday (approximately!)**: Review Quiz will be due.
- **Every other Sunday (approximately!)**: Homework will be due.

NOTE: All due dates and times will be in Eastern Daylight Time and no late assignments will be accepted.

Lectures

The lectures in this course consist of interactive instruction from the posted notes, along with readings from the textbook. On occasion, we may cover additional materials. It is your responsibility to read through the corresponding textbook chapter prior to each lecture.

Daily Activities

You learn software and statistical methods by doing them! Expect to regularly work on problems during the class time, generally in pairs or groups (but individual in-class assignments may be assigned). These assignments consist of learning software to perform statistical analysis and communicating the analytical results. These assignments will be due by midnight on the day of the activity, with a built-in 8-hour *grace* period.

If you are absent from class, you are expected to reach out to your instructor to let them know **prior** to class. You are responsible for reading the textbook chapter for the day, reading through the class notes and completing the in-class assignment. **You will normally receive credit for these assignments only if you are in attendance for the class period; exceptions may be granted *if you contact your instructor before class*.**

Homework

Homework sets will be assigned throughout the semester (anticipating *six* assignments). The homeworks are intended to assess your understanding of statistical material and to extend the knowledge gained within the lectures and daily activities. There will be a built-in 8-hour grace period beyond the deadline for each homework. Late homework will **not** be accepted unless granted **prior** permission from the instructor.

Review Quizzes

Review Quizzes will be assigned to assess your understanding of class concepts (anticipating *six* assessments). Quizzes will be administered via Canvas and must be completed individually and without the aid of another person. All quizzes are closed notes, and students will not have access to R on their computers and/or any other outside resources while completing quizzes. Use of Generative AI while completing quizzes is not allowed. Quizzes will be proctored using Proctorio (online proctoring service). All Proctorio videos

may be reviewed for each quiz. Quizzes must be completed in one sitting - once you have started the quiz, you cannot exit and return to the quiz.

Quizzes in this class are designed to help you evaluate your learning so you may attempt each quiz up to **two times**, and the highest grade will count. If you are going to take it a second time, you should review your performance and study the TOPICS that you missed (not the questions, as you will likely get different questions) before taking it again. There will be a built-in 8-hour grace period beyond the deadline for each quiz. Late quizzes will **not** be accepted unless granted **prior** permission from the instructor.

Exams

Three exams will be given in this class. There will be an In-Person and Take Home portion of each exam. Tentative exam dates are as follows:

	Date	Content
Exam #1	Section A & B: Wednesday 2/25 during class time Section C: Thursday 2/26 during class time	Chapters 1-4 (ANOVA, Multiple Comparisons, Blocking, DOE, Advanced Designs, etc...)
Exam #2	Section A & B: Wednesday 4/8 during class time Section C: Thursday 4/9 during class time	Chapters 5-8 (Multiple Regression, Assumptions of Regression, Transformations, etc...)
Final Exam	Section A - Wednesday, May 13 @ 12:45pm Section B - Monday, May 11 @ 12:45pm Section C - Thursday, May 14 @ 8am	Cumulative, but will concentrate on material from Chapters 9-12 (Model Selection, Model Validation, Logistic Regression)

Final Grade Calculation

Item	Contribution to Final Grade
Daily Activities • Expect two per week, due the day they are assigned • Practice performing statistical analysis in RMarkdown	15%
Homework • More in-depth application	25%
Review Quizzes • Expect a review quiz once every two weeks • Quizzes will cover the previous two weeks of material	10%
Exam #1	15%
Exam #2	15%
Final Exam	20%

Grading Scale

A+ = [97, 100]	A = [93, 97)	A- = [90, 93)	
B+ = [87, 90)	B = [83, 87)	B- = [80, 83)	
C+ = [77, 80)	C = [73, 77)	C- = [70, 73)	
D+ = [67, 70)	D = [63, 67)	D- = [60, 63)	F = [0, 60)

Class Materials

You will need access to a computer, chromebook, or iPad to complete this course. Any of the major operating systems (Windows, Mac or Linux) is acceptable as long as the device is compatible withR and R Studio. A small notebook may be useful to take notes during lectures.

Course Textbook

Introduction to Statistics Modeling Using R, (2nd edition) by Hughes and Fisher (available through the Canvas site).

Software

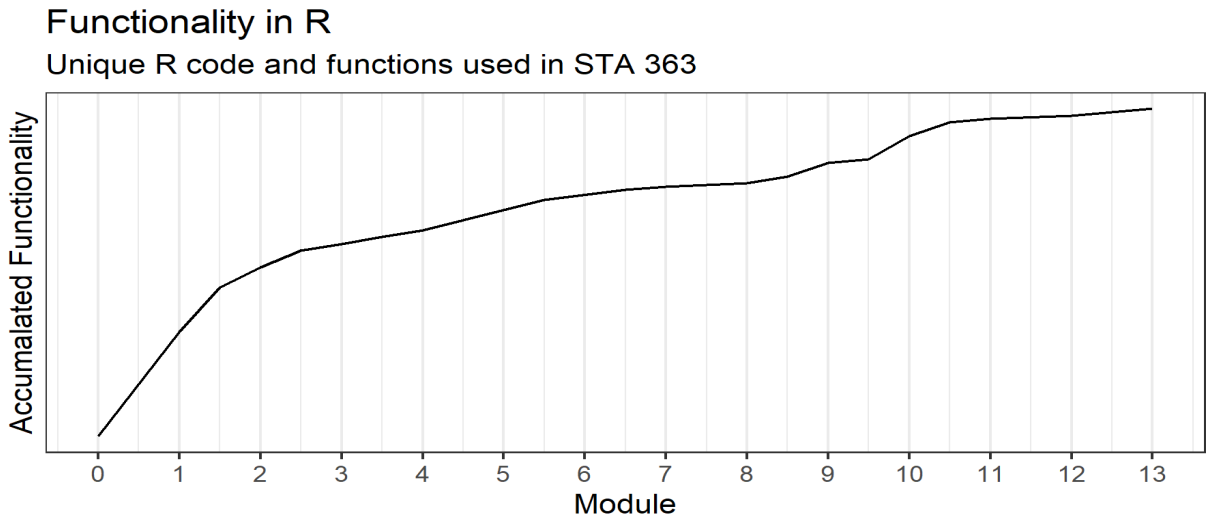
In this course we will be utilizing R and RStudio extensively. You can download both pieces of software for free from:

- http://cran.r-project.org/
- http://www.rstudio.com/

Countless resources are available for help in using this software.

We recommend you complete Homework #0 as soon as possible.

Note: R is a computing language for statistical analysis. It does require *coding*! However, being a proficient computer programmer is NOT a prerequisite (we do not *program* in 363, but we do *code*). The learning curve in the first few weeks of the course can be steep for some students, but normally by week 3 most students become more comfortable with the coding elements.



Supplemental Help

- *An R Companion to Linear Statistical Models,* Hay-Jahans.
- *Practicing Statistics: Guided Investigations for the Second Course,* Kuiper & Sklar
- *Using R for Introductory Statistics,* Verzani
- youtube.com - search for R or RStudio help

Student & Instructor Expectations:

You, as a student, should try your best to:

- Check the Canvas class site at least once per day during the workweek.
- Check your Miami email every 24 hours (more often if you have sent an email to the instructor or a classmate).
- Read Announcements sent via Canvas. Check Announcements on Canvas before emailing your instructor, as the information may have already been posted.
- When you have any questions about the course, feel free to ask your instructor during office hours, email your questions to your instructor, or post questions you have about the course in the CANVAS Discussion Forums. If you can answer another student's question in the Discussion Forums, without violating the academic integrity policy, please feel free to do so.
- Actively participate in all class sessions, discussions, and other activities required in this course.
- React to others' ideas. Exchange thoughts with fellow students and the instructor.
- Complete all readings in a timely manner so you can get help if needed.
- Submit assignments by their due date and time.
- Spend at least 6-9 hours a week outside class, studying, reading the textbook, and completing assignments.
- Submit work that demonstrates a clear understanding of the material.
- Keep an open mind regarding the material and the opinions of others.
- Notify the instructor, in a timely manner (within 24 hours), if you have any problems.

The instructor will try his/her best to:

- Check the Canvas class site every day to monitor progress.
- Check email at least twice a day, Monday through Friday.
- Respond to all emails within 24 hours (except on weekends).
- Post all grades within 7 days of assignment due dates, except for homework (which may require up to 2 weeks).
- Make every effort to meet with students who request a meeting.

Use of AI Tools: Use of Generative AI (ChatGPT, etc…) in any phase of completing assignments is not encouraged. The purpose of assignments in this class is for you to generate your own thoughts on statistical material and to practice articulating concepts in your own voice.

AI can be a powerful tool, but only when used thoughtfully and ethically. Think of AI as a sophisticated, always-available tutor, not a substitute for your own critical thinking and effort. Thus, you are permitted to use AI to help you when you get stuck on a practice problem but you are required to put concepts into your own words, and **cite your use of the tool**. You may use AI to assist in idea/topic generation, organizing/outlining, etc…. Any use of AI in your work must be cited appropriately. Citation includes submitting screenshots of your prompt and output and indicating within the text when information from AI is being used and providing an appropriate reference section citation.

Please keep in mind, you are responsible for your final submission. Your submission should demonstrate **your understanding** of the information. Your submission must meet the assignment guidelines. You may not use AI to wholly generate your final submission.

Please keep in mind that AI is an ever developing tool. It can be helpful at times but it is also known to "hallucinate". You are responsible for the work that you submit - nonsense answers or work that goes beyond the scope of the class will indicate inappropriate use of AI. If you submit fake sources/citations/quotes, that will be academic dishonesty. If you submit inaccurate information, that will result in a poor grade.

Note: We do not expect you to know everything about a topic or to write in a perfect or highly academic/professional style. If you are having trouble understanding the concepts, getting started, or want help with your writing, please feel free to talk with us as the instructors.

Note: AI is NOT permitted for assessment assignments (quizzes and exams).

Academic Integrity

Academic Integrity is at the heart of the mission and values of Miami University and is an expectation of all students. Maintaining academic integrity is a reflection of your character and a means to ensuring that you are achieving the outcomes of this course and that your grades accurately reflect your learning and understanding of the course material. Cutting corners or cheating in this class will result in cheating yourself out of learning. This class is a foundational course in the major. If you do not understand the concepts learned in this class, you will struggle in your future classes and in your future job. Cheating now may lead to a future of cheating and other unethical behavior to cover up the fact that you didn't learn what you were supposed to learn. Try your best, ask questions, and be ethical. Don't be a cheater! Academic integrity is a partnership between me, as the instructor, and you, as the student. My role, as instructor of this course, is to facilitate learning and to provide you with clear guidelines and feedback to help you maintain your academic integrity. Your role in this course is to take responsibility for your learning and to complete all assignments in an honest manner and to ask for clarification from me if you are unsure of how to do so.

From the Academic Integrity Policy (Part 1, Chapter 5 of the Student Handbook (http://miamioh.edu/policy-library/students/undergraduate/academic-regulations/academic-integrity.html).

Academic dishonesty is defined as any activity that compromises the academic integrity of the institution or subverts the educational process. Examples of academic dishonesty include, but are

not limited to:

Acts of academic dishonesty (from the Academic Integrity Policy)

1. Cheating: using or attempting to use or possessing any unauthorized aid, information, resources, or means in the completion of an academic assignment or providing such assistance to another student.
2. Plagiarism: presenting as one's own the work, the ideas, the representations, or the words of another person/source without proper attribution.
3. Fabrication: falsification, invention, or manipulation of any information, citation, data, or method.
4. Unauthorized collaboration: working with another individual or individuals in any phase of or in the completion of an individual academic assignment without explicit permission from the instructor to complete the work in such a manner.
5. Misrepresentation: falsely representing oneself or one's efforts or abilities in an academic assignment or one's own or another's attendance in or ability to attend a class session or exam/quiz.
6. Gaining an unfair advantage: completing an academic assignment through use of information or means not available to other students or providing such means to others, completing an academic assignment in an unauthorized location, or engaging in any activity that interferes with another student's ability to complete their academic work.

Collaboration on Assignments: You are encouraged to discuss the concepts and material of the course with your peers to increase your understanding of the course content. In this class you will have both individual and collaborative assignments.

1. On individual assignments, you must use your own words and understanding to complete assignments. You are encouraged to complete assignments without your peers around you and without copying your notes verbatim to demonstrate your own understanding of the material.
2. On collaborative assignments, you will work with peers to complete one assignment. Each student involved in the collaboration should contribute equally to each response. Students should not divvy up questions or parts and merely paste the responses into one document. You will complete a collaboration reflection for each collaborative assignment.

Writing, Citation, and Plagiarism: The purpose of all assignments in this course is for you to demonstrate your understanding of the material, your ability to critique or apply it, and your ability to build on it or bring in knowledge from other areas. You are encouraged to spend significant time reading for, understanding materials in connection with one another, drafting, and revising your written assignments. For all assignments, you are expected to provide proper attribution and use of all sources and source material (e.g., use of in text and reference citation, use of quotation marks, proper summarizing/paraphrasing). You are expected to do so not only to demonstrate how well you are able to incorporate and interpret source material to aid in your argument or understanding but also to distinguish others' thoughts from your own. Proper attribution and use of source material is the cornerstone of academic writing and allows you to build upon others' ideas in your work.Merely copying and pasting (or restating) others' work in your assignment with little to no original thought will not constitute an acceptable assignment, and any use of source material without proper attribution and usage will be handled under the Academic Integrity Policy and procedures as suspected plagiarism. You are encouraged (but not required) to use APA style in all assignments. If you do not know how to use APA style, please talk to me and/or consult the Howe Writing Center and online resources. Remember, writing well is more than citing well. Even if all of your citations are technically accurate, if you do not put information and ideas into your own understanding, it is still considered plagiarism. DO NOT COPY AND PASTE in any stage of your writing. Usage of writing-assistive tools (e.g., grammar apps, translators, AI Chatbots) must be approved by me before use and attributed properly. If you need additional help with written assignments, I encourage you to schedule an appointment with the Howe Writing Center, English Language Learner Writing Center, or the Tutoring and Learning Center. All assignments will be submitted through Turnitin.

Suspected Dishonesty: Any suspected instances of academic dishonesty will be handled under Miami University's Academic Integrity policy found in Part 1, Chapter 5 of the Student Handbook. Please review this policy, and note that lack of knowledge or understanding of the appropriate academic conduct is not an excuse for committing academic dishonesty. The list above outlines the definition of types of acts that are considered academic dishonesty. The following is a list of acts particularly pertinent to this class and if violated will be considered academic dishonesty:

- All exams are to be completed individually. You are not to consult with anyone about your exam.
- All individual assignments are to be completed as described in this syllabus. Students are not to submit individual assignments that contain the same or too similar wording as others.
- All assignments must be in your own words and understanding. You are encouraged to use APA style and provide proper references/citation for all sources used (including the use of quotation marks).
- You must paraphrase and summarize well. Too much similarity in wording between the original source and your work will be considered plagiarism. If you need to use the original words, do so, and use quotation marks.

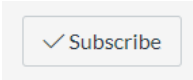
- You must submit original work for this class. You may not submit any work that you have completed for another class.
- You may not give your partially or completed work to any other student.
- You may not use Generative AI in any phase of your assignments.

Students who are found responsible for committing academic dishonesty will receive a sanction that ranges from a zero on the assignment to an F in the course, which could also include the AD transcript notation. Students who commit academic dishonesty twice automatically will be suspended from Miami. Students may also be required to complete an educational seminar. If you have questions about how to complete an assignment or what could constitute academic dishonesty for a particular assignment, please ask. It is better to ask first than have to explain yourself later. If you find yourself in a situation in which you are unable to ask for clarification, please do not try to cut corners or rely on a peer for assistance. It is better to submit flawed or incomplete work than dishonest work. Ask yourself what is better – getting a C on an assignment because it wasn't completed or potentially getting an F on the assignment (or for the course) and having a record of academic dishonesty?

Maintaining academic integrity comes down to how seriously you take your own learning, being responsible for your own learning, and the choices you make about what kind of student you will be and how you will complete your academic work. I promise to uphold my end of our academic partnership in this class, and I hope you choose to do the same.

Communication Guidelines & Netiquette

Announcements: Please subscribe to the Course Announcements so you can be automatically notified about important information through your email. To subscribe for auto-email notifications, click on the Subscribe button:



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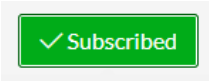

Discussion Forum: This is the place to ask questions about course content, homework, and "in-class" assignments when you cannot work with others face to face. General questions about the course should also be asked here so that all students may benefit from the answers. Check the Discussion Forum for answers to your questions before asking during office hours or sending an email to the instructor or graduate assistants. Questions that you do not wish to share with the class should be sent directly to your instructor via email, or discussed during office hour meetings.

Contacting Your Instructor: Email is the best way to reach your instructor. However, if you would prefer to have a conversation, you may speak to your instructor during office hours or send your instructor an email to set up a time to meet. Given today's ease of communication, it is your responsibility to contact your instructor within 24 hours if you are having any problems. While instructors will attempt to answer emails quickly, it may take up to 24 hours (or longer on weekends) for you to receive a response. Many faculty receive over 50 emails a day: we ask that you put "STA 363" in the subject line of your email to help us sort and search. We will do the same with announcements and emails.

Communication Guidelines: Email is the official mode of communication for the University. You are responsible for any communication that is sent to your Miami email account, so please be sure to check your account frequently. If you have your email forwarded to your preferred account, please be sure you have enough server space for your Miami emails and please check to see that your server will accept Miami emails.

You will be asked to communicate with other students in this class via email. You may access email tools on the Canvas class site. All group members are responsible for initiating contact with one another as soon as the assignment is opened. Failing to make contact with your group members is not an excuse to miss completing an assignment.

Netiquette:* Diversity has many manifestations, including diversity of thought, opinion, and values. We encourage **all learners to be** polite and **respectful** and to refrain from inappropriate or offensive commentary when you use the Discussion Forums. If inappropriate or offensive content is either emailed or posted on the class site, I recommend college disciplinary action. Students guilty of academic misconduct, either directly or indirectly through participation or assistance, are subject to disciplinary action through the regular procedures of Miami University. Learners as well as faculty should be guided by common sense and basic etiquette. Criticism should be presented in a positive light. The following are good guidelines to follow:

- Never post harassing, threatening, or embarrassing comments.
- Never post content that is harmful, abusive; racially, ethnically, or religiously offensive; vulgar; sexually explicit; or otherwise potentially offensive.
- Never post, transmit, promote, or distribute content that is known to be illegal.
- If you disagree with someone, respectfully respond to the subject, not the person.
- Treat others as you would like to be treated.
- Use emoticons such as 🙂 or ;-) when you are joking.
- Be timely in your communication with others.
- Be as brief and succinct as possible.
- Include a descriptive subject line in all emails.
- Use proper spelling and grammar.

- Cite sources appropriately.

Remember that “tone” can usually be detected accurately in verbal communication, but often can be misunderstood in electronic communication. Because of this phenomenon, we encourage you to err on the side of politeness.

*adapted from Regents Online Campus Collaborative

For more information on netiquette check Netiquette Rules for Electronic Communications.

ADA & Students with Disabilities

Miami University is committed to ensuring equal access to students with disabilities. Miami's Office of Student Disability Services (SDS) assists students with determining eligibility for services and accommodation planning. Miami's AccessMU provides resources and guidance toward equal opportunity for all individuals. Refer to Miami University's Accessible Technology Policy for definitions and additional information.

Students who are entitled to disability-related academic adjustments, auxiliary aids, etc., must register with SDS to receive accommodations in university courses. Please understand that formal communication from SDS must be presented prior to the coordination of accommodations for this course. For more information, see Student Disability Services and/or the Rinella Learning Center. Students may also contact SDS at (513) 529-1541 or via email at sds@miamioh.edu.

If you have a disability, please contact me, and I will be glad to make any necessary accommodations.

Diversity & Discrimination

All Miami University policies concerning diversity and equal opportunity will be upheld in this class.

> Miami University is a community dedicated to intellectual engagement. Our campuses consist of students, faculty, and staff from a variety of backgrounds and cultures. By living, working, studying, and teaching, we bring our unique viewpoints and life experiences together for the benefit of all. This inclusive learning environment, based upon an atmosphere of mutual respect and positive engagement, invites all campus citizens to explore how they think about knowledge, about themselves, and about how they see themselves in relation to others. Our intellectual and social development and daily educational interactions, whether co-curricular or classroom related, are greatly enriched by our acceptance of one another as members of the Miami University community. Through valuing our own diversity, and the diversity of others, we seek to learn from one another, foster a sense of shared experience, and commit to making the university the intellectual home for us all.

Please see the General Bulletin for more information.

> Miami University is committed to providing equal opportunity and an educational and work environment free from discrimination on the basis of sex, race, color, religion, national origin, disability, age, sexual orientation, gender identity,

military status, or veteran status. Miami shall adhere to all applicable state and federal equal opportunity/affirmative action statutes and regulations.

Please see the Miami University policies regarding discrimination and harassment for more information.

Resources and Support for Students

As instructors, I have a duty to report. This means I am required to promptly report to the Deputy Title IX Coordinator (titleix@miamioh.edu or 513-529-1870) any information a student shares with me regarding harassment, discrimination, sexual misconduct and interpersonal violence, or retaliation. **A report does not initiate an investigation. It engages a discussion of your resources, supportive measures, and options available.** If students want to speak with someone confidentially, they can speak with Student Counseling Services, Student Health Services, and an advocate with Women Helping Women.

Speaking with a confidential resource person does not preclude students from making a formal report to the University if and when they are ready.
https://miamioh.edu/diversity-inclusion/programs-resources/report-incident/index.html

For more information, please visit https://miamioh.edu/campus-safety/sexual-assault/ and https://www.miamioh.edu/diversity-inclusion/oeeo/index.html.