

MA 3260-01 Discrete Structures. 3 Credits
Matthew Haner, Math and Computer Science
Fall 2021

Legal Notice

This isn't a legal notice! Seriously, this is a syllabus. Syllabi aren't legal documents. I have no plans to be deceptive, but I reserve the right make changes to this class as I see fit. If I deviate from this syllabus, I promise to be as fair as possible.

Prerequisites

A willingness to work and learn. Some mathematical maturity (like what one gains in Calculus) and precalculus skills.

Catalog Description

Foundations of mathematics emphasizing fundamental concepts in abstract mathematics and deductive reasoning. Topics include logic, mathematical induction, graph theory, recurrence relations, difference equations, Boolean algebra, sets, functions, relations, cardinality, number systems, and algorithms.

Professor Information

My name is Matthew Haner. My office is in Elliott Hall on the first floor, room 115-C. The surest and most preferred way to get in contact with me is through email, which I typically check many times a day. mhaner@mansfield.edu. Phone: 4707.

Office Hours

Posted online here: <http://faculty.mansfield.edu/mhaner/time.html>

Tenatively, they are Tuesday/Thursday 3PM – 5PM on campus, and Wednesday 11AM – Noon via Zoom. For my on-campus hours, we'll find an open classroom for office hours since my office is pretty small. If my times don't work for you, let me know and we can work something out.

Room/Time

Section 1: T/Th 6:15PM --7:30PM in Elliott 102.

We might shift rooms the first week. And don't forget there is a chance the class becomes online.

Class Cancellations

In addition to discussions which will take place in class and during office hours, I will communicate with you by email. In the unlikely event of cancellation of a class due to inclement weather, illness or emergency, you will receive an email. Be sure to check your official university email often.

Webpage

<http://faculty.mansfield.edu/mhaner/Index.html> This is an official addition to this syllabus. I suggest you bookmark or add it to your favorites for the duration of this class. It contains the most up-to-date information about the class, including a day-by-day class schedule.

Text

Applied Discrete Structures Version 3.7 by Al Doerr and Ken Levasseur. You may download it from <http://faculty.uml.edu/klevasseur/ads2/>

Grading

1/3 of your total grade for each of three tests, which will probably have both an in-class and take-home portion. Be aware that I may collect selected homework problems as part of the exam. You will be instructed in class as to which problems they might be, and I will mark them online.

Attendance/Late Policy

If you are behind for valid reasons, please let me know. There are no make-up quizzes or homework, and exams are excused when I receive the proper documentation in accordance with official university policy. Excused exams will have their scores replaced with your final exam score or removed from your grade.

Tutoring

All students are encouraged to make use of the free tutoring services provided by the Learning Resources Center. More information can be found on my website. Furthermore, online help may be found at the Wolfram Math World site or on Wikipedia. Be wise in what you choose as a source of information online!

Learning Mathematics

I expect about 3 hours of outside work per hour of class time. To become proficient as a carpenter, dancer, or mechanic requires practice. Mathematics is no different and you will not learn it by watching alone. Do not take this class unless you are prepared to work and seek help when it is needed. If you do put in the proper amount of time and find help when you are stumped, you will learn the material. It is better for your learning process to spend regular intervals of time working on mathematics than it is to cram it in long sessions.

Incidentally, a college education is distinctly different from high-school in several regards. Here I am specifically addressing the traditional students that just completed secondary school: though I care about my students as much as any high school teacher does, I will not chase you around to make sure you're doing the appropriate work for this class. Being at the university level means that you are responsible for your actions. Also, there are an awful lot of syllabi that document acceptable behavior similar to a legal framework. Please, just be an adult about your actions. And for it, you will be treated as adults.

The second primary difference between this class and a high-school equivalent class is the level of difficulty. Although some with outstanding backgrounds will find this course easy, almost all of you will struggle from time-to-time. There will be problems on exams that are tough. Regardless of what your path in life will become, it is nearly certain to contain tough challenges. I hope to do my part and prepare you for these challenges. Do try and take these challenges in stride, as it is much easier to work mathematics with a good dose of optimism. When you look back on your degree from Mansfield, I hope that you hold some pride that you endured the difficulties. Really it's not unlike playing a guitar, drawing a person, training to be a marine, or becoming an outstanding athlete.

MU's Health and Safety Plan for Fall 2021 and the Student Code of Conduct

Mansfield University's Student Code of Conduct prohibits the violation of any University policy as well as local, state, or federal laws. Expressly included in this expectation are any federal, state, regional, or local emergency orders or declarations, mandatory policies, or mandatory health advisory requirements, including those made by the University President. Mansfield's Health and Safety Guide for Fall 2021 recommends that members of the Mansfield University community comply with certain measures, including social distancing and the wearing face coverings, to help reduce the risk of spreading COVID-19. Social distancing and the wearing of face coverings guidance are based on the recommendations from the Centers for Disease Control and Prevention (CDC) in all buildings and classrooms. Face coverings, must cover both the nose and mouth. Students who do not conform any specified university mandate of mitigation actions are in violation of the Student Code of Conduct and subject to the appropriate sanctions. Violations of the student Code of Conduct, will be reported to the University's chief conduct officer, William Kluge, at wkluge@mansfield.edu.

Regarding the enforcement of Mansfield's Health and Safety Plan, it is important to recognize the critical nature that full compliance with these policies will play in the success of this semester. It must be understood that non-compliance with these policies by just a few could jeopardize the health and safety of the entire Mansfield community as well as our ability to continue offering in-person instruction during Fall 2021, and therefore violations will be treated accordingly. As such, repeated violations shall result in the appropriate sanctions based upon the circumstances involved. Please note: Students who have medical conditions that prevent them from wearing face coverings or complying with other risk-mitigating mandates must contact Melinda Phillips in the Coordinator of Services for Students with Disabilities at mphillip@mansfield.edu or 570.662.4436 to request accommodations.

Mansfield University Attendance Policy (as stated in the MU Catalog)

Regular and punctual class attendance is expected. Documented excuses because of illness, serious mitigating circumstances, official military service, or official university representation will be accepted by all faculty members. Absences due to COVID-19-related illness, quarantine, and/or isolation will be excused as well. In these cases, faculty members will permit students to make up all graded course components without penalty in a reasonable manner at a time agreeable to instructor and student. Students must provide documentation before absences can be excused. All instructors are expected to make their class participation and attendance policies clear in the course syllabi. Faculty are encouraged to report two missed classes in a row to absent@mansfield.edu for follow-up.

Students Requesting Academic and/or Access Accommodations

Students with documented learning disabilities, physical challenges, mental health diagnoses, or other significant medical conditions whose learning or participation may be affected in this course, should meet with Melinda Phillips, the Coordinator of Services for Students with Disabilities (SSD Coordinator) in the Office of Services for Students with Disabilities located in 144 South Hall (570.662.4436) for a review of qualification for reasonable accommodations. It is recommended that students contact the SSD Coordinator during the first two weeks of classes or immediately upon diagnosis to ensure accommodations are met in an efficient, appropriate, and timely manner for the best student learning outcome. Upon qualification, the Coordinator will arrange to provide an accommodation letter to the professor for the identification of academic or accessibility adjustments. You must contact the Office of Services for Students with Disabilities to renew accommodation letters at the start of each semester.

Mansfield University Statement on Diversity and Inclusion

As expressed in Mansfield University's Mission and Vision statement, our institution strives to "nurture the whole student through an inclusive, diverse, and welcoming community." As such, we welcome

students, faculty, and staff from diverse backgrounds. We expect all interactions between community members to be respectful, whether in person or online, both in and out of the classroom.

Academic Integrity

The integrity of all scholarly work is at the foundation of an academic community. Students are expected to do their own academic work. Dishonesty in academic work, including cheating, academic misconduct, fabrication, or plagiarism, is unacceptable. Faculty are expected to instruct students in ways of avoiding these forms of academic dishonesty. Faculty are also responsible for assessing and reporting all charges of academic dishonesty to the appropriate Dean. MU's Academic Integrity Policy can be found at <http://www.mansfield.edu/academic-affairs/faculty-resources/upload/Mansfield-University-Process-for-Reporting-Academic-Integrity-Violations-Rev-3-09.pdf> and the Academic Dishonesty Form may be accessed here or from the Academic Affairs website.

Copyright

Mansfield University fully supports and adheres to the Copyright laws of the United States and other nations. Respect for intellectual labor and creativity is vital to academic discourse and enterprise. This principle applies to any original work in any tangible medium of expression. Images displayable on computer screens, computer software, music, books, magazines, journals, photographs, and articles are among items subject to copyright. A work need not be explicitly labeled with a copyright notice to be afforded copyright protection. For more information on Copyright please consult the Mansfield University Copyright Information website: <http://mansfield.libguides.com/copyright>.

Student Consumer Rights and Responsibilities

The Higher Education Opportunity Act (HEOA) was enacted in 2008 and reauthorized the amended Higher Education Act of 1965. HEOA requires postsecondary educational institutions to distribute or make publicly available a broad range of information collectively known as Student Consumer Information. Topics covered under HEOA include student financial aid, campus health and safety, student outcomes, as well as general institutional information. Mansfield's Student Consumer Information website is located at this link: <http://mansfield.edu/HEA/>.

Title IX and Protection of Minors Legislation: Reporting Obligations

Mansfield University and its faculty are committed to assuring a safe and productive educational environment for all students.

Sexual Discrimination or Misconduct and Title IX Requirements

In order to meet this commitment and to comply with Title IX of the Educational Amendments of 1972, all University officials, volunteers and employees (including student employees) are obligated to report incidents of sexual misconduct of which they become aware to the Title IX Coordinator/designee, unless: 1) they serve in a role that makes such reports privileged or are recognized as providing a confidential resource; or 2) they are a faculty member and learn of the report from a student during a classroom discussion, in a writing assignment for a class, or as part of a University-approved research project. These reporting exceptions do not apply to report of sexual misconduct involving an individual who was, or is, a child (a person under 18 years of age) when the abuse allegedly occurred. When a report involved suspected abuse of a child (an individual under the age of 18 at the time of the incident(s) as reported), all University employees, officials and volunteers are required to notify the University police and the Child Line run by the Pennsylvania Department of Human Services. Reports regarding Title IX and sexual misconduct should be directed to Mansfield University, Title IX Coordinator titleix@mansfield.edu or cm.maxient.com/reporting form. Additional information regarding the reporting of sexual violence and the resources that are available to victims of sexual assault and/or harassment can be found at mansfield.edu/title-ix.

Protection of Minors Requirements

Faculty members are obligated to report sexual violence or any other abuse of a student who was, or is, a child (a person under 18 years of age) when the abuse allegedly occurred. Mandated reporters must immediately make an oral report of suspected child abuse to the Department of Human Services (DHS) by calling 800-932-0313. Immediately following the report to DHS, the mandated reporter must notify Human Resources (570-389-4151), as designated in the University's protection of minors policy. No exceptions apply to this reporting obligation. Mansfield University's Protection of Minors policy is available at <http://www.mansfield.edu/hr/protection-of-minors.cfm>.

Mansfield University Process for Reporting Academic Integrity Violations

If a faculty member believes that a student has engaged in some form of academic dishonesty, the faculty member is expected to complete an Academic Dishonesty Form, identify the level of violation as described below, share the form with the student, and request that the student sign the form to indicate whether he or she is guilty or not guilty of the charge. The student has three options:

- (a) to indicate academic dishonesty and accept the sanctions as recommended by the faculty member;
- (b) to indicate academic dishonesty for an especially serious violation and face possible suspension or academic dismissal through the Academic Standards Review Board; or
- (c) to claim innocence of the charge(s) or to indicate that the sanction(s) proposed by the faculty member is too severe.

In the last two situations, the Academic Standards Review Board Chairperson will appoint a Hearing Board to review the case. Reports of all violations must be forwarded with supporting evidence to the office of the appropriate Dean (based on the course in which the alleged violation occurred) who shall maintain a record of all infractions and penalties.

Level One Violations. Level One violations may occur because of inexperience, carelessness, or lack of knowledge of principles of academic integrity on the part of students committing the violation. These violations are likely to involve a small fraction of the total course work, are not extensive, or occur on a minor assignment. The following are examples:

1. Working with another student on a laboratory or other homework assignment when such collaborative work is not permitted.
2. Failure to footnote or give proper acknowledgment in a limited section of an assignment.
3. Signing into class for another student who is absent.
4. Leaving a class or lab without permission after signing in.

Faculty have discretion in identifying an appropriate sanction for a violation. Recommended sanctions for Level One violations are listed below; one of these may be chosen by the instructor in each case:

1. Failure of the relevant assignment.
 2. An additional assigned paper or research project on a relevant topic.
 3. A make-up assignment at a more difficult level than the original assignment.
 4. Reduction of points toward final grade.
 5. Written or verbal warning to the student accompanied by a report to the Dean so that a permanent record is established in accord with university policy.
- Records of students who commit Level One offenses will be maintained in the Dean's Office until the student's graduation.

Level Two Violations. Level Two violations are characterized by dishonesty of a more serious nature or that affects a more significant aspect or portion of the course work. The following are examples:

1. Quoting directly or paraphrasing, to a moderate extent, without acknowledging the source.
2. Submitting the same work or major portions thereof to satisfy the requirements of more than one course without permission from the instructor.
3. Two or more students submitting similar or identical work for the same assignment.
4. Using data or interpretative material for a laboratory report without acknowledging the sources or the collaborators.

5. Receiving assistance from others, such as research, statistical, computer programming, or field data collection help that constitutes an essential element in the undertaking without acknowledging such assistance in a paper, examination, or project.

The recommended sanction for Level Two violations is failure of the assignment or, if the assignment is a major portion of the course, failure of the course. Records of students who commit Level Two offenses will be maintained in the Dean's Office until graduation. A second charge at Level Two may, at the discretion of the Dean, lead to academic suspension and a notation of "suspended for academic dishonesty" on the student's permanent transcript.

Level Three Violations. Level Three violations are serious, go well beyond Level One or Two and, in the opinion of the faculty member and the Dean, require adjudication at the University level. Level Three Violations include dishonesty that affects a major or essential portion of work done to meet course requirements, involves premeditation, or is preceded by one or more violations at Levels One or Two. Cases involving Level Three violations are routinely referred to the Academic Standards Review Board. Examples include:

1. Copying significant portions of a midterm or final examination.
2. Plagiarizing major portions of a written assignment.
3. Facilitating illicit copying during an exam.
4. Using prohibited materials, e.g., books, notes, or electronic devices during an examination.
5. Collaborating before an exam to develop methods of exchanging information and implementing such acts.
6. Actions of academic dishonesty similar to criminal activity (such as forging a grade form, stealing an examination from a professor or from a university office; purchasing an examination; falsifying a transcript to secure entry into the University; or changing the record of work done at the University).
7. Altering examinations for the purposes of re-grading.
8. Acquiring or distributing an examination from unauthorized sources prior to the examination.
9. Intentionally presenting the work of another as one's own.
10. Having a substitute take an examination or taking an examination for someone else.
11. Using purchased term papers or other materials.
12. Removing posted or reserved material, or preventing other students from having access to such information.
13. Fabricating data by inventing or deliberately altering material.
14. Using unethical or improper means of acquiring data.
15. Willful violation of an ethical code of the profession for which a student is preparing. The sanction typically sought for Level Three violations or repeated violations of Level One and Two offenses is a minimum of failing a course or, in more serious instances, a one-semester suspension from the University. For the most serious of these offenses, students may be dismissed following the recommendation of the Hearing Board. In instances where a student is suspended or dismissed, there shall be a notation of "suspended/dismissed for academic dishonesty" entered on the student's permanent transcript.

In all instances where a student requests an appeal or the faculty member and Dean agree that suspension or dismissal is appropriate, the case shall be referred to the Academic Standards Review Board for consideration. Both the student and the faculty member will be invited to the proceeding of a Hearing Board, and both will be able to present relevant evidence. The Hearing Board, in these cases will be comprised of a minimum of two faculty and one student from the Academic Standards Review Board.

Following their review of the case, the Hearing Board will make a recommendation to the faculty member and the Provost regarding the disposition of the case. The Hearing Board may conclude that it finds the student guilty or not guilty of the charge of academic dishonesty, or it may decide that the sanction is too severe or not severe enough for the violation. The conclusions of the Hearing Board are recommendations

to the faculty member and the Provost. If a student remains dissatisfied with the status of his or her case following the recommendations of the Hearing Board, the student may appeal directly to the Provost.

Program Outcomes

The following core program outcomes will be achieved by all students in the B.S. Mathematics degree program, regardless of concentration.

P1. Common Mathematics Content Knowledge: Students will gain an understanding and awareness of the key concepts found in the standard subject areas of calculus, logic, set theory, linear algebra, probability and statistics, and the history of mathematics.

P2. Proof and Justification: Students will develop the skills necessary to formulate and understand proofs and to provide justification.

P3. Abstract reasoning: Students will develop the ability to reason abstractly and rigorously.

P4. Technology: Students will develop skills necessary to use technology in doing and learning mathematics

Course Goals

To begin to indoctrinate students to the reasoning, language, and practice involved in higher-level mathematics.

Course Objectives

- O1. Develop a foundation of set theory concepts and notation.
- O2. Develop formal logical reasoning techniques and notation.
- O3. Demonstrate the application of logic to analyzing and writing proofs.
- O4. Develop techniques for counting, permutations and combinations.

Student Learning Outcomes (Assessment Device)

Students will be able to:

- 1. Demonstrate a proficient understanding and ability to use basic concepts and notation of sets. O1, P1, P3. (Test 1.)
- 2. Determine the truth value of compound statements. O2, P1, P3. (Test 2.)
- 3. Demonstrate simple proofs using standard rules of inference: direct, indirect, contradiction, and induction O3, P1, P2, P3. (Test 3.)
- 4. Demonstrate correct application of algorithms for counting permutation and combination for given contexts. O4, P1, P3. (Test 1.)