UMass Global in partnership with Westcott Courses

Course content approved by University of Massachusetts Global.

Course Title:	Methods of Proof in Mathematics
Course Code:	MATU 220
Credits:	4
Credit Provider:	UMass Global
Proctored Final:	Yes

Textbook Requirement

Mathematical Proofs: A Transition to Advanced Mathematics (3rd Edition)

- Chartrand, Gary; Polimeni, Albert; Zhang, Ping

- Textbook ISBN-10: 0321797094

- Textbook ISBN-13: 978-0321797094

Text Book on Amazon

Check the price on abebooks.com, as their price is usually lower than Amazon.

Course Description

This course is an introduction to abstract mathematics, with an emphasis on the techniques of mathematical proof (direct, contradiction, conditional, contraposition). Topics to be covered include logic, set theory, relations, functions and cardinality.

Note: This course is proof based. All homework assignments, exams and the final are graded by the instructor.

Prerequisite:

Calculus I, Calculus II and Calculus III (Or Business Calculus, Calculus II and Calculus III.) If student's Calculus II course covered sequences and series, then Calculus I - Calculus II is sufficient. The courses must be taken from a U.S. regionally accredited college within the last 10 years and received a C or better.

Learning Outcomes

At the conclusion of this course, students should be able to:

1. Apply the logical structure of proofs and work symbolically with connectives and quantifiers to produce logically valid, correct and clear arguments.
2. Perform set operations on finite and infinite collections of sets.
3. Determine equivalence relations on sets and equivalence classes.
4. Identify a function, surjection, injection, bijection and work with inverse images and inverse functions.
5. Apply multiple techniques of mathematical proof (direct, contradiction, conditional, contraposition, and induction).
6. Write solutions to problems and proofs of theorems that meet rigorous standards based on content, organization and coherence.

Methods Of Evaluation

Homework quizzes 15%

Chapter Tests (5) 60%

Final Exam 25%

Students must complete all coursework before they take the Proctored Final Exam.

(You must get at least 60% on this final in order to pass the class with a C or better.)

Homework:

Homework assignments are essential in a mathematics course. It is not possible to master the course without a considerable amount of time being devoted to studying the concepts and using the concepts to solve problems. Each lesson contains a set of homework problems.

Chapter Tests (5):

The chapter tests are designed to cover a broader area of the text and test your understanding of the material.

Proctored Final: 25%

This course goes towards a 4-year degree; thus, it requires a proctored final.

Students are responsible for proctoring fees.

We have an approved online proctor service that students can use if they have a web camera with their computer. This can be a laptop with a built in camera or a desktop with a web cam. This service charges $60 for group sessions and double for private sessions. A student can also be proctored at college testing center, Sylvan Learning Center, Prometric Testing center, or Pearson Vue Testing Center. No other options are available.

A valid driver's license or State ID must be shown at the testing center. An expired license or State ID will not be accepted. Use this link to help you find a college testing center or Sylvan Learning center near your home:

Proctored Final

The final exam is a comprehensive final covering all of the chapters of the course. Other than scratch paper, you may view the "Authorized Materials" list for the final exam for each class.

*Students must obtain a 60%

or better on the final exam in order to get a C or better in the class.

The 60% rule was set in place to protect the integrity of online education by requiring a display of competency in exchange for a grade. All schools which are regionally accredited adhere to online standards. Your college is accepting this course because it goes through a regionally accredited university, which tells your college that standards have been met. Your college will not accept a class from a school that is not regionally accredited, because they know the standards won't be met.

Assessment

A 90-100 A Clearly stands out as excellent performance and, exhibits mastery of learning outcomes.

B 80-89 B Grasps subject matter at a level considered to be good to very good, and exhibits partial mastery of learning outcomes.

C 70-79 C Demonstrates a satisfactory comprehension of the subject matter, and exhibits sufficient understanding and skills to progress in continued sequential learning.

D 60-69 D Quality and quantity of work is below average and exhibits only partial understanding and skills to progress in continued sequential learning.

F 0-59 F Quality and quantity of work is below average and not sufficient to progress.

Content Menu

Course Content Menu:

Chapter 1. Sets

1.1. Describing a Set

1.2. Subsets

1.3. Set Operations

1.4. Indexed Collections of Sets

1.5. Partitions of Sets

1.6. Cartesian Products of Sets

Chapter 2. Logic

2.1. Statements

2.2. The Negation of a Statement

2.3. The Disjunction and Conjunction of Statements

2.4. The Implication

2.5. More on Implications

2.6. The Biconditional

2.7. Tautologies and Contradictions

2.8. Logical Equivalence

2.9. Some Fundamental Properties of Logical Equivalence

2.10. Quantified Statements

2.11. Characterizations of Statements

Chapter 3. Direct Proof and Proof by Contraposition

3.1. Trivial and Vacuous Proofs

3.2. Direct Proofs

3.3. Proof by Contrapositive

3.4. Proof by Cases

3.5. Proof Evaluations

Chapter 4. More on Direct Proof and Proof by Contrapositive

4.1. Proofs Involving Divisibility of Integers

4.2. Proofs Involving Congruence of Integers

4.3. Proofs Involving Real Numbers

4.4. Proofs Involving Sets

4.5. Fundamental Properties of Set Operations

4.6. Proofs Involving Cartesian Products of Sets

Chapter 5. Existence and Proof by Contradiction

5.1. Counterexamples

5.2. Proof by Contradiction

5.3. A Review of Three Proof Techniques

5.4. Existence Proofs

5.5. Disproving Existence Statements

Chapter 6. Mathematical Induction

6.1. The Principle of Mathematical Induction

6.2. A More General Principle of Mathematical Induction

6.3. Proof By Minimum Counterexample

6.4. The Strong Principle of Mathematical Induction

Chapter 8. Equivalence Relations

8.1. Relations

8.2. Properties of Relations

8.3. Equivalence Relations

8.4. Properties of Equivalence Classes

8.5. Congruence Modulo n

8.6. The Integers Modulo n

Chapter 9. Functions

9.1. The Definition of a Function

9.2. The Set of All Functions from A to B

9.3. One-to-one and Onto Functions

9.4. Bijective Functions

9.5. Composition of Functions

9.6. Inverse Functions

9.7. Permutations

Chapter 10. Cardinalities of Sets

10.1. Numerically Equivalent Sets

10.2. Denumerable Sets

10.3. Uncountable Sets

10.4. Comparing Cardinality of Sets

10.5. The Schr?der-Bernstein Theorem
-->

Final Exam for Methods of Proof

Course Content Menu

This course is online and your participation at home is imperative. A minimum of 8 - 10 hours per week of study time is required for covering all of the online material to achieve a passing grade. You must set up a regular study schedule. You have five months of access to your online account with a thirty-day extension at the end if needed. If you do not complete the course within this time line, you will need to enroll in a second term.

Code of Conduct:

It is the student's responsibility and duty to read the information below and become acquainted with all provisions of what constitutes academic misconduct involving cheating and plagiarism. Students are required to read each statement below, and the given repercussion. There are no exceptions to these policies, and the pretext of not reading each part will not be deemed as a reasonable excuse to contest the policies.

Code of Ethics:

Regulations and rules are necessary to implement for classroom as well as online course behavior. Students are expected to practice honesty, integrity and respect at all times. It is the student's responsibility and duty to become acquainted with all provisions of the code below and what constitutes misconduct.

Respectful communications:

When contacting Westcott Courses, you agree to be considerate and respectful. Communications from a student which are considered by our staff to be rude, insulting, disrespectful, harassing, or bullying via telephone, email, or otherwise will be considered a disrespectful communication and will result in a formal warning.

We reserve the right to refuse service. If we receive multiple disrespectful communications from person(s) representing the student, or the student themselves, the student will be excluded from taking future courses at Westcott Courses.

Grading information and proctored final policies:

The grading rules are put in place to protect the integrity of online education by stopping grade inflation, which is done by demanding a display of competency in exchange for a grade. By agreeing to the terms of service agreement, you agree to read the 'Grading' Policy from within your account, and the 'Proctored Final Information' page, if applicable. You have 24 hours after your first log-in to notify us if you do not agree to the grading policy and proctored final policy (if applicable) outlined in the pages inside of your account, otherwise it is assumed that you agree with the policies. There are no exceptions to these policies, and the pretext of not reading the pages will not be deemed as a reasonable excuse to contest the policies.

The definition of academic cheating is an act of dishonesty in order to obtain a higher grade in the course, and to gain an advantage over other students in the course.

To maintain academic standards, students are expected to practice honesty, integrity and respect at all times. Students who violate the policies of cheating, plagiarizing, or other academic misconduct will result in following actions.

1) Cheating in any way on the final exam results in an F on the final and an F in the class.

This includes, but is not limited to any form of collaboration, use of unauthorized materials, receiving or providing unpermitted assistance on the exam, using outside digital assistance such as a cell phone, tablet, ETC. to communicate with others or access outside websites, having someone else take the exam for you, taking an exam for another student, failing to stop working on the exam when the time is up.

Final exams are secure tests and the intellectual property of Westcott Courses. Taking screen shots of a digital final or copying a paper test is stealing our intellectual property and cheating. It is equivalent to stealing a copy of the final exam off an instructor's desk. When one student obtains the questions on a final, it means that other students who don't have the questions on the final are at a disadvantage. Once a final exam has been compromised it is no longer secure, and the exam is unfair for those who have not performed an act of dishonesty to gain the advantage.

Each of the infractions above represents a result of performing an act of dishonesty in order to obtain a higher grade in the course, and to gain an advantage over other students in the course. The result of any of the above offenses is an F in the course. Students who violate the above policy may retake the course after a first offense; however, a second offense will result in expulsion and students will no longer be able to take other courses at Westcott Courses.

Students are responsible for clicking on the "Proctored Final Information" link (which is on student's Main Menu), and reviewing the list of Authorized Materials for each course's final exam. Since each course is different, the "Authorized Materials" for each final is different. For example, some courses permit notes, while others do not.

2) Plagiarism: All of the following are considered plagiarism, and will result in a zero on the plagiarized assignment, and there are no opportunities to redo the assignment.

Merriam-Webster defines plagiarism as "the act of using another person's words or ideas without giving credit to that person"

Plagiarism includes, but is not limited to:

* having somebody else write your assignment for you

* turning in an assignment that contains work that is not your own

* changing words in phrases, sentences and/or blocks of text without giving credit to the source (paraphrase)

* copying ideas, phrases, sentences or entire blocks of text without giving credit to the source

* not crediting the correct source by providing incorrect information

Plagiarism is an act of fraud, and can usually be avoided by using quotation marks and citing the source of the material. Instructors apply plagiarism software to find assignments that contain plagiarized material. Again, assignments that contain one of the above infractions will receive a zero on the assignment and the student will not have the opportunity to redo the assignment.

It is important to note that saving all your assignments to the end of the course, and then turning in multiple assignments that have been plagiarized will result in zeros on all of those assignments. This may mean that you no long have enough points in the course to pass the class. Thus, turning in assignments one at a time and waiting for instructor feedback in-between is important for learning and making sure that you maximize your possible points.

If you have questions, please read more information about plagiarism at plagiarism.org, or ask your instructor.

Other Examples of Academic Misconduct:

1) Other forms of cheating include altering an exam and submitting it for regarding, providing false excuses to postpone due dates, fabricating data or references, claiming that Westcott Courses lost your test and/or quiz scores, sending emails to Westcott claiming you did not know what you were doing was cheating.

2) Unauthorized collaboration - working with others on graded course work without specific permission of the instructor, including homework assignments, programs, quizzes and tests.

3) Copying Westcott Courses content and posting it on the internet. This includes assignments, quizzes, and tests.

By signing up for a course, you are legally signing a contract that states that the person who is named taking this course is the actual individual doing the course work and all examinations. You also agree that for courses that require proctored testing, that your final will be taken at a college testing center, a Sylvan Learning center, or at home using the online proctor. Also, the individual signed up for this course will be the one taking the test. Failure to do so will be considered a breach of Westcott Courses policies.

Important Notes:

This syllabus is subject to change and / or revision during the academic year. Students with documented learning disabilities should notify our office upon enrollment, as well as make sure we let the testing center know extended time is permitted. Valid documentation involves educational testing and a diagnosis from a college, licensed clinical psychologist or psychiatrist.