

Math/CS 205 – Foundations of Logic and Proof – Spring 2026

Instructor

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Office: Eggleston 110

Office hours: by appointment

Section 1

8:30-9:45am MWF

Birdsong 201

Section 2

11:30am-12:45pm MWF

Birdsong 201

Textbook: No textbook, just course notes posted on Blackboard.

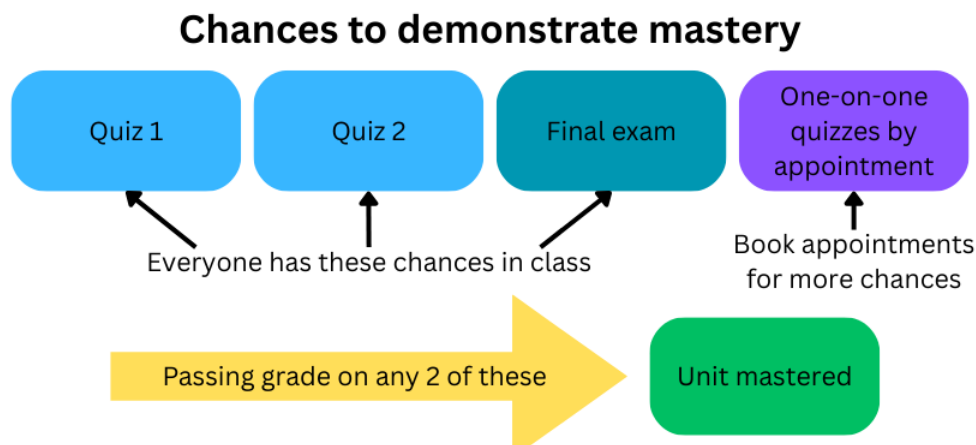
Mastery-based grading: In this course, your grade depends on how well you eventually master the course topics on a unit-by-unit basis. You will have multiple chances to demonstrate mastery of each unit, and doing poorly on a single quiz doesn't tank your grade. Your final grade is determined by the number of units you master and the number of homework assignments you complete, using this table.

		Homework												
		0-19	20	21	22	23	24	25	26	27	28	29	30	31+
Unit mastery	0-5	F	F	F	F	F	F	F	F	F	F	F	F	F
	6	F	D-	D	D	D	D	D	D	D	D	D	D	D
	7	F	D-	D	D+	C-	C-	C-	C-	C-	C-	C-	C-	C-
	8	F	D-	D	D+	C-	C	C	C	C	C	C	C	C
	9	F	D-	D	D+	C-	C	C+	B-	B-	B-	B-	B-	B-
	10	F	D-	D	D+	C-	C	C+	B-	B	B+	B+	B+	B+
	11	F	D-	D	D+	C-	C	C+	B-	B	B+	A-	A-	A-
	12	F	D-	D	D+	C-	C	C+	B-	B	B+	A-	A	A
	13	F	D-	D	D+	C-	C	C+	B-	B	B+	A-	A	A

Homework: Each Monday, you will turn in:

- Three worksheets from the previous week. Each worksheet will be marked complete/incomplete. Worksheets will not be accepted after this deadline.
- (Optional) A corrected version of one quiz from any previous week. Corrections are only accepted if all “core content” was correct.

Unit mastery: Course content is broken into 13 units, one unit per week. You have at least three chances to demonstrate mastery of each unit: two quizzes and the final exam. You are considered to have mastered a unit after receiving a passing grade two times. If two quizzes and final exam aren't enough, you can get more chances by booking an office hour appointment for an oral quiz on a unit.



- **Quizzes.** At the start of class on Wednesdays and Fridays, 20 minutes. Each quiz is one sheet front and back, and material is divided into “core content” (usually the front page) and the rest (usually the back page). To pass a quiz, all core content must be correct with no mistakes, and around 50-75% of the rest must be correct.

Once per week, you can submit a corrected quiz with homework, if all core content was correct.

- **Office hour assessments.** For make-up quizzes or additional chances, make an office hour appointment through the Google calendar link on Blackboard for a one-on-one oral assessment. Maximum once per week per student.
- **Final exam.** Each unit will have a separate page on the final exam, and each page is graded pass/fail as if it were a quiz. The final exam for Section 1 (8:30am section) is Tuesday, May 12 at 8am. The final exam for Section 2 (11:30am section) is Wednesday, May 13 at 11:30am.

Disability accommodations: Talk to me if you have an accommodations letter so that we can discuss your specific needs. If you do not have a letter, contact disabilityservices@vwu.edu.

Attendance and alerts: Attendance is not part of the grade, but I will take attendance and I will submit an academic alert any time a student misses two consecutive classes.

Office hours: By appointment through a link on Blackboard. If you no-show or cancel an office hour within 12 hours, I will not accept appointments from you for 30 days.

Units

This page describes what you need to know do in order to complete each of the 13 units.

- ☐ **1 Notation and sets** – I can distinguish mathematical data types: boolean, number, tuple/vector, set, statement, and variable statement. I can use and read these symbols:

$\emptyset, \mathbb{N}, \mathbb{Z}, \mathbb{Q}, \mathbb{R}, \mathbb{C}, \in, \notin, \subseteq, \subsetneq, \supsetneq, \cup, \cap, \langle a, b \rangle, \{a, b\}, (a, b), [a, b], |x|, \lfloor x \rfloor, \lceil x \rceil, \vee, \wedge, \oplus, \neg, \implies, \iff, \forall, \exists$

- ☐ **2 Statements and truth tables** – I can read and make truth tables, and use truth tables to prove tautologies and logical equivalences. I can form the converse and contrapositive of an implication statement. I can identify when an implication statement, its converse, and its contrapositive are true or false. I can prove basic quantified statements.

- ☐ **3 Negating statements** – I can negate “and,” “or,” and “xor” statements using truth tables and DeMorgan’s Laws. I can negate implication and double implication statements. I can negate quantified statements. I can disprove a statement by negating it and proving the negation.

- ☐ **4 Proofs in number theory** – I can use and understand the terms even, odd, factor, multiple, divisor, prime, remainder, mod, and % notation for remainder. I can prove statements involving these concepts, using direct proof or proof by contrapositive.

- ☐ **5 Proofs with inequalities** – I can prove statements about inequalities of real numbers using direct proof or proof by contrapositive. I can distinguish between definitions and theorems.

- ☐ **6 Set builder notation** – I can read and write set builder notation. I can convert between set builder notation and listing elements in either direction.

- ☐ **7 Subsets and set equality** – I can prove that one set is a subset of another. I can prove that two sets are equal by proving that each is a subset of the other.

- ☐ **8 Nested quantified statements** – I can read, interpret, negate, and prove nested quantified statements.

- ☐ **9 Proof by contradiction** – I can prove statements using proof by contradiction. I can reproduce the proof that $\sqrt{2}$ is irrational, and the proof that there are infinitely many primes.

- ☐ **10 Partial order relations** – I can use $\sim$ notation for relations. I can identify and prove whether a relation is reflexive, transitive, or antisymmetric. I can identify if a relation is a partial ordering.

- ☐ **11 Equivalence relations** – I can identify and prove whether a relation is symmetric, reflexive, or transitive. I can prove that a relation is an equivalence relation. I can identify when a collection of sets is or is not a partition. I can describe the equivalence classes of an equivalence relation.

- ☐ **12 Proof by induction** – I can prove statements by induction.

- ☐ **13 Functions** – I can use $f : A \rightarrow B$ notation for functions, and identify the domain, range, and codomain of a function. I can read and describe functions in terms of arrows, formulas, or verbal descriptions. I can identify and prove when a function is one-to-one, onto, or invertible.

Note: Mastery of unit 13 requires only one pass, and there is only one quiz.

Schedule

Day	Unit	Topic	Quiz/HW
Week 1			
Mon, Jan 26	Notation and sets	Mathematical data types	
Wed, Jan 28	Notation and sets	Symbols for sets	
Fri, Jan 30	Notation and sets	Symbols for statements	
Week 2			
Mon, Feb 2	Statements and truth tables	Truth tables and tautologies	HW1
Wed, Feb 4	Statements and truth tables	Converse and contrapositive	Q1A
Fri, Feb 6	Statements and truth tables	Quantified statements	
Week 3			
Mon, Feb 9	Negating statements	Negating and, or, and xor statements	HW2
Wed, Feb 11	Negating statements	Negating implications	Q2A
Fri, Feb 13	Negating statements	Negating quantified statements	Q1B
Week 4			
Mon, Feb 16	Proofs in number theory	Evens and odds, remainder	HW3
Wed, Feb 18	Proofs in number theory	Direct proofs with remainders	Q3A
Fri, Feb 20	Proofs in number theory	Contrapositive proofs with remainders	Q2B
Week 5			
Mon, Feb 23	Proofs with inequalities	Direct proofs with inequalities	HW4
Wed, Feb 25	Proofs with inequalities	Contrapositive proofs with inequalities	Q4A
Fri, Feb 27	<i>No class</i>		
Week 6			
Mon, Mar 2	Set builder notation	Reading set builder notation	HW5, Q3B
Wed, Mar 4	Set builder notation	Writing set builder notation	Q5A
Fri, Mar 6	Set builder notation	More with set builder notation	Q4B
Week 7			
Mon, Mar 9	Subsets and set equality	Proving $A \subseteq B$	HW6
Wed, Mar 11	Subsets and set equality	Proving two sets are equal	Q6A
Fri, Mar 13	Subsets and set equality	Proving two sets are equal	Q5B
Mar 16-20	Spring break		

Day	Unit	Topics	Quiz/HW
Week 8			
Mon, Mar 23	Nested quantifiers	Nested quantified statements	HW7
Wed, Mar 25	Nested quantifiers	Proving nested quantified statements	Q7A
Fri, Mar 27	Nested quantifiers	Negating nested quantified statements	Q6B
Week 9			
Mon, Mar 30	Proof by contradiction	Basic proofs by contradiction	HW8
Wed, Apr 1	Proof by contradiction	Proof that $\sqrt{2}$ is irrational	Q8A
Fri, Apr 3	Proof by contradiction	Infinitely many primes	Q7B
Week 10			
Mon, Apr 6	<i>No class</i>		
Wed, Apr 8	Partial order relations	Relations, reflexivity, transitivity	HW9, Q8B
Fri, Apr 10	<i>No class</i>		
Week 11			
Mon, Apr 13	Partial order relations	Antisymmetry and partial orderings	Q9A
Wed, Apr 15	Equivalence relations	Symmetry, equivalence relations	HW10
Fri, Apr 17	Equivalence relations	Equivalence classes and partitions	Q10A
Week 12			
Mon, Apr 20	Proof by induction	Summation formulas	HW11, Q9B
Wed, Apr 22	Proof by induction	Fibonacci numbers	Q11A
Fri, Apr 24	Proof by induction	More induction	Q10B
Week 13			
Mon, Apr 27	Functions	Functions, domain and range	HW12
Wed, Apr 29	Functions	One-to-one, onto, and inverses	Q12A
Fri, May 1	<i>No class</i>		
Week 14			
Mon, May 4		Make up quizzes	Q11B
Wed, May 6		Review	HW13, Q12B, Q13A
Fri, May 8	<i>No class</i>		
Exam week			
Tue, May 12	8:30am Final exam	8:30am section (section 1)	
Wed, May 13	11:30am Final exam	11:30am section (section 2)	

Note: There is no Q13B.

Math 205 – Quick Reference

Table for final grades

		Homework												
		0-19	20	21	22	23	24	25	26	27	28	29	30	31+
Unit mastery	0-5	F	F	F	F	F	F	F	F	F	F	F	F	F
	6	F	D-	D	D	D	D	D	D	D	D	D	D	D
	7	F	D-	D	D+	C-	C-	C-	C-	C-	C-	C-	C-	C-
	8	F	D-	D	D+	C-	C	C	C	C	C	C	C	C
	9	F	D-	D	D+	C-	C	C+	B-	B-	B-	B-	B-	B-
	10	F	D-	D	D+	C-	C	C+	B-	B	B+	B+	B+	B+
	11	F	D-	D	D+	C-	C	C+	B-	B	B+	A-	A-	A-
	12	F	D-	D	D+	C-	C	C+	B-	B	B+	A-	A	A
	13	F	D-	D	D+	C-	C	C+	B-	B	B+	A-	A	A

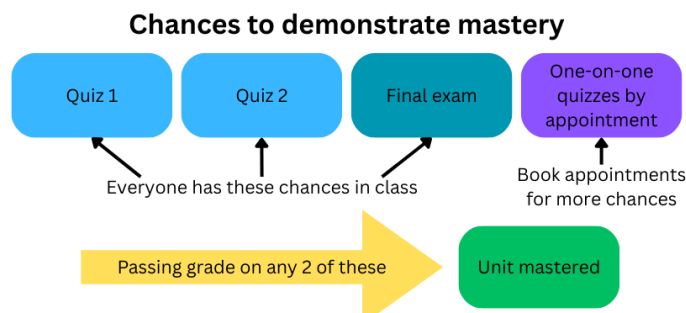
Track your progress

Homework: Check boxes for completed worksheets.

1 ☐☐☐☐ 5 ☐☐☐☐ 9 ☐☐☐☐ 13 ☐☐☐☐
 2 ☐☐☐☐ 6 ☐☐☐☐ 10 ☐☐☐☐
 3 ☐☐☐☐ 7 ☐☐☐☐ 11 ☐☐☐☐
 4 ☐☐☐☐ 8 ☐☐☐☐ 12 ☐☐☐☐

Units: Check boxes for partial/full mastery.

1 ☐☐ 5 ☐☐ 9 ☐☐ 13 ☐
 2 ☐☐ 6 ☐☐ 10 ☐☐
 3 ☐☐ 7 ☐☐ 11 ☐☐
 4 ☐☐ 8 ☐☐ 12 ☐☐



Example of how this works with unit 1:

Jan 26-30 – Three classes on unit 1, working on example problems in class, homework includes more practice

Feb 4 – First quiz on unit 1

Feb 13 – Second quiz on unit 1

If you pass both quizzes, unit 1 is mastered. If not, you can submit a corrected quiz with homework, schedule an office hour for an additional quiz, or attempt it on the final.

Frequently asked questions:

1. *I missed class because of illness/sports/funeral/overslept, what do I do? Can I make up the quiz I missed?*

Consult Blackboard for the posted notes document, and ask a classmate to see their notes. To make up a quiz, book an office hour appointment. If you missed a Monday for illness or other good reason and notified me in advance, you can submit the work on Wednesday.

2. *I didn't turn in my homework because of illness/sports/funeral/overslept/forgot, will you still accept it?*

Worksheets should be turned in early if you miss for a university-approved, anticipate-able reason like a sporting event. For an unexpected absence, I will accept worksheets at the next class (Wednesday).

3. *I'm struggling, what can I do?*

Come chat with me. Book an office hour appointment and come prepared with questions about what is confusing you. Get in touch with the tutoring center.

4. *I did all the homework but am struggling with unit masteries, will my grade take this into account?*

No, that is not how grades are calculated in this class. You must complete at least 6 skills to pass the class. Completing homework assignments beyond 40 does not help your grade.