FAIRMONT STATE UNIVERSITY

# Mathematical Logic

Math 2510-001 || CRN: 21057 || Spring 2023

**Instructor:** Dr. Tom Cuchta
**Email:** tcuchta@fairmontstate.edu
**Time:** TR 9:30–10:45
**Location:** ET 436
**Office:** ET 423
**Drop-in office hours:** Please see my website for the times when I have scheduled my daily office hours: http://tomcuchta.com. Office hour times may change without notice; the website will always contain my current official schedule. Alternate times may always be scheduled by email.
**Class webpage:** http://tomcuchta.com/teach/classes/2023/MATH2510-Spring2023-FairmontState/
**Textbook:** *forallx: An Introduction to Formal Logic* – free open source text downloadable on the course webpage here
**Course description:** This course covers sentential and general theory of inference, theory of proof and definition and elementary intuitive set theory.
**Tech requirements:** Written homework will be regularly submitted to Blackboard. There is possibility of using the Lean programming language in this course – instruction on this will be provided if it occurs.
**Course delivery:** Our course will meet in-person. There will be no synchronous streaming.
**Attendance policy:** Attendance itself will ***not*** be recorded for a grade. If a class is missed, then it is the ***student's responsibility*** to find out what was missed.
**Exams:** There will be three regular exams and a final exam in this course. The final exam is worth double.
**Coursework:** You will receive work in this course in various "grade categories", described on the next page. The following standard scale applies:

| Grade | Percentage |
|---|---|
| A | ≥90% of points |
| B | ≥80% of points |
| C | ≥70% of points |
| D | ≥60% of points |

The grading scale is as follows:

| A | B | C | D | F |
|---|---|---|---|---|
| +4 points | +3 points | +2 points | +1 point | +0 points |

- "A" (+4) – excellent; perfect submission, no errors;
- "B" (+3) – good; nearly perfect maybe with some errors (e.g. arithmetic);
- "C" (+2) – some problems; there are some issues but you are on the right track;
- "D" (+1) – tried; there are fundamental issues or misunderstandings but it is clear that you made an honest attempt; and
- "F" (+0) – not gradable; does not seem to contain an honest attempt at the work.

**Written work:** Written homework is comprised of problems that will be assigned on the class webpage and submitted through Blackboard. Generally speaking, there will be approximately **two** such assignments per week of class. Grades of B, C, D, or F will receive feedback from the instructor that must be addressed if the student chooses to revise the submission. **Written work that contributes to the problems of any exam must be first submitted within 1 week of that exam occurring (with the obvious exception of the final exam).**
Revisions must come with a reflection essay, at least two paragraphs long, containing **both** a description of what went wrong with the student's thinking and approach in the first submission **and** a description of what was done to improve it in the resubmitted version. Only problems identified in the feedback need to be revised, but the ***whole*** problem should be rewritten (not just "corrected"). Improperly formatted revisions will be returned with the grade of F.
The highest score among all submissions will be the one that counts for the grade.

**Quizzes:** Quizzes will be regularly given in class and will not be announced in advance. Expect about one quiz per week, but occasionally more.

**Final grade:** Each grade category (written HW, quizzes) will receive a letter grade for each 5 week period based on the work that was due in that 5 week period. Consider the following chart of possible grades in a semester:

| 5 Wk. Period | Written HW | Quizzes | Total Grade |
|---|---|---|---|
| 1 | C (+2) | B (+3) | +5 |
| 2 | B (+3) | A (+4) | +7 |
| 3 | A (+4) | C (+2) | +6 |

The four exam scores (three exams + one final counting double) contribute another possible 20 points. The total in the last column in the table plus the points from exams are divided by 44 to obtain the percentage score for the course. For example, if the student obtained the following scores on exams: A, B, C, B, then they gained an additional 4+3+2+3*2=15 points along with their 5+7+6=18 to get 15+18=33 points out of a possible 44 which is 75%, a C.

**LEAD Center:** The Learning Enrichment and Academic Development Center (LEAD) is located on the second floor of the library and provides students with free support resources, including learning assistance in a wide range of courses. The LEAD Center opens no later than the second week of classes. To book an appointment, see more information on services, hours, or a list of current workshops, visit `https://www.fairmontstate.edu/academics/lead-center`. You may also contact the coordinator Brittany Cuchta at `lead@fairmontstate.edu`.

**Cheating:** I encourage you to work together, to attend tutoring, and to seek out help from me. However, copying the work of others and not putting in an honest effort yourself is not acceptable. If you are caught cheating on any assignments, then you will forfeit any points on that assignment with no possibility of revision. If you are caught cheating more than once, then you may receive an "F" in the course.

**Safety:** We follow the university guidelines, which may change as the semester progresses. See the current university policy pertaining to the coronavirus here: `https://www.fairmontstate.edu/coronavirus`. Those who prefer to always wear a mask are encouraged to do so.

**Student handbook:** http://www.fairmontstate.edu/publications/campushandbooks/studenthandbook/default.asp

**Accessibility support:** Accessibility services are available to any student, full or part-time, who has a need because of a documented disability. It is the student's responsibility to register for accessibility services and to provide any necessary documentation to verify the need for accommodations. Students must provide their professors with a copy of their academic accommodation letter each semester in order to receive accommodations. Faculty, students, and the Office of Accessibility Services must cooperate to ensure the most effective provision of accommodations for each class.

The Office of Accessibility Services is located in 237 Hardway Hall. For additional information, please call (304) 367-4543.

**Learning outcomes:**

1. Identify when a structure satisfies or does not satisfy a given set of axioms.
2. Determine and justify whether the conclusion of a given argument follows logically from the premises.
3. Given several sentences, determine whether or not they are independent of the others in the given set.
4. Use the language of mathematics to translate sentences into formulas using a given vocabulary within first order logic.
5. Prove a theorem in a theory the student has not seen before.

# Estimated Math 2510-001 Calendar Spring 2023

| **Week** | **Sections** |
|---|---|
| 16 Jan – 20 Jan | 16 January: ***MLK Day – no classes*** |
| 23 Jan – 27 Jan | |
| 30 Jan – 3 Feb | |
| 6 Feb – 10 Feb | 9 February: ***EXAM 1*** |
| 13 Feb – 17 Feb | |
| 20 Feb – 24 Feb | |
| 27 Feb – 3 Mar | |
| 6 Mar – 10 Mar | ***SPRING BREAK – NO CLASSES*** |
| 13 Mar – 17 Mar | |
| 20 Mar – 24 Mar | 23 March: ***EXAM 2*** |
| 27 Mar – 31 Mar | |
| 3 Apr – 7 Apr | |
| 10 Apr – 14 Apr | |
| 17 Apr – 21 Apr | 20 April: ***EXAM 3*** |
| 24 Apr – 28 Apr | |
| 1 May – 5 May | 1 May: ***LAST REGULAR DAY OF CLASSES***<br>2 May–5 May: ***FINAL EXAMS*** |