SYLLABUS

MAT 320-02 (2987)	**Foundations of Mathematics**

August 28, 2017

College of Engineering, Forestry, and Natural Sciences
Dept. of Mathematics and Statistics
2:20 – 3:35 pm, MW, AMB 163
3 credit hours

Lecturer: Michael Falk   Office: AMB 132,   523-6891
    e-mail: `michael.falk@nau.edu`
    Personal web page: `http://www.cefns.nau.edu/∼falk`
    Course web page: `http://www.cefns.nau.edu/∼falk/classes/320/index320.html`
    BBLearn page: `https://bblearn.nau.edu`

Office hours: MW 4:00 – 5:30, TuF 2:00 – 3:00, Th by appointment.
    I'm available to students at most other times during the week, and am always happy to talk to students about mathematics; drop by or make an appointment.
    Virtual office hours - I encourage students to e-mail me with questions - my e-mail address is above. I will respond quickly.

Web page and e-mail: On the course web page given above I will post hints, study outlines, and other useful and/or interesting information. In case I want to communicate with the entire class, I will express myself on the web page. I will use the course BBLearn page to post grade information, exams, problem sets, and solutions, and list of exercises.
    I will also send occasional e-mails to the entire class. If at some point you decide you do not wish to receive these e-mails, please let me know. Make sure I have an e-mail address for you that is checked regularly.

Text: D. Smith, M. Eggen, and R. St. Andre, *A Transition to Advanced Mathematics*, 7th edition.
    You may use other editions, but will need to compare the exercise lists with the 7th edition to make sure you are working the correct assignment. There will be several additional topics covered in lecture and on the problem sets - lecture notes will be provided.

Goals and Objectives: As the course title suggests, we will study the foundations of mathematics: formal logic, sets, functions, relations, number systems, and cardinality. Particular topics will include: propositions and connectives, quantifiers, rules of inference, methods of proof, naive set theory, axiomatic set theory, families of sets, mathematical induction, equivalence relations and partitions, order relations, injective and surjective functions, the natural numbers, construction of the natural numbers within ZFC, the Peano axioms, rational numbers, infinite sets, countable and uncountable sets, the real number system, the Axiom of Choice. Throughout our study of these fundamental notions of mathematics, we will emphasize the nature of valid proof in mathematics, with the intent of developing in students the ability to create and write clear, logical, and mathematically rigorous arguments of their own.
    This material is covered in Sections 1.1-1.7, 2.1-2.5, 3.1-3.4, 4.1-4.6, and 5.1-5.5 of the text. Examples and exercises will involve mathematical objects with more structure, such as partially-ordered sets, finite groups of substitutions, finite topological spaces, and other elementary concepts from subsequent courses. Some of this latter material is not in the text; supplemental notes will be provided.

Student Learning Outcomes: Upon completion of the course students will be able to: (i) write a readable and mathematically rigorous proof; (ii) express in writing knowledge of the terminology, concepts, basic properties, and methodology of symbolic logic, set theory, relations and functions, mathematical induction, cardinality and number systems; (iii) propose useful definitions and make correct deductions from definitions; (iv) identify correct proof structures and criticize incorrect proof structures.

Evaluation : The grading system is based on a total of 1000 points. The point system is designed to reward students for activities that enhance learning, including preparing for and writing in-class exams, working on problem sets and exercises, and attending lecture.
    There will be 3 midterm exams, worth 125, 140, and 160 points respectively, and a cumulative final worth 225 points. There will be eight graded problem sets worth 30 points each. Exercises assigned

from the text will be collected periodically, and checked for completeness (not correctness), for 70 points. Attendance will be taken daily, worth 40 points.

Some provision will be made for interested ENG 305W students who write mathematics papers for that course to have them accepted for credit in this course. Interested students should consult the lecturer. At the end of the semester, the point totals are "curved" to arrive at letter grades for the course. The curve is determined by the distribution of scores and my sense of the appropriate level of achievement for the various grade levels. Whatever is the median score will be at least in the middle of the C range; usually the median score is between 62% and 68%. It is very unlikely that the lowest C will be below 50%. Students' grades and exam score and intermediate grade distributions (with letter grades assigned) will be posted regularly on Bb Learn. These intermediate grades are not used in the determination of grades at the end of the course.

Course policies and expectations : *Students may bring one sheet of notes to consult during exams.* Three to four pages of notes will be allowed for the final exam. Make-up exams will be given only if the student notifies the instructor prior to the scheduled exam. Exam dates are listed below. Midterm exam periods are 60 minutes long. Students will be asked to place all personal belongings, including all cell phones, at the front of the room for the duration of each exam period. Any violation of the department cell phone policy (stated on page 3), or the university academic integrity policy will result in a formal report and sanction. See https://policy.nau.edu/policy/policy.aspx?num=100601.

Students are encouraged to work together and to seek assistance from me on all homework. It is expected that all solutions will be composed and written individually by each student in a concise, grammatically correct, and readable form. To avoid the possibility of plagiarism, students are expected to explicitly cite any sources (including web pages and interpersonal communication) that had an impact on the student's submitted work.

Late homework may be handed in at any time during the semester for half credit. (If handed in before solutions are posted or discussed in class, late homework will receive 3/4 credit.)

Students are expected to attend class, except in case of illness or institutional excuse, engage with the material being presented, take notes, and ask questions in and out of class to mitigate any confusion or lack of understanding. Students are expected to silence cell phones and not use them during class. Students expecting to receive credit for attendance should arrive on time and remain in class for the entire period.

Important dates :

Exam 1	Friday, September 29
Exam 2	Friday, October 27
Exam 3	Wednesday, November 22
Final Exam	Tuesday, December 12, 3:00 pm - 5:00 pm

Other important dates:

Monday, September 4	Labor Day, no classes
Thursday, September 7	last day to drop/delete or add a class,
Friday, November 3	last day to withdraw.
Friday, November 10	veteran's Day (observed), no classes
Thursday-Friday 11/23-24	Thanksgiving break, no classes
Friday, December 8	last day of classes