Mathematics 312 – WINTER 2016
PROOFS IN ELEMENTARY ANALYSIS
CRN # 10603 – MTRF 10:00–10:50 – Room BH 221

 Instructor: Arpad Benyi, Professor
Office: BH 218 – TE : 650–3710
E–mail: arpad.benyi@wwu.edu
URL: http://faculty.wwu.edu/benyia/teachingwinter2016
Office Hours: MTRF 12:00–12:50, and by appointment.

Text: Proofs in Elementary Analysis
by Branko Curgus

Prerequisites: Math 226 and Math 302/Math 309

Classroom presentations
A significant part of this class is dedicated to your own board presentations. The list of suggested exercises or statements that can be used for class presentations (and, by default, as preparation for the exams) will be posted at
http://faculty.wwu.edu/benyia/teachingwinter2016.html
This list is updated regularly to reflect the statements already proved in class, so make sure to check the class website before attempting a given statement.
Part of your daily routine should be to read the text and to revise and critically assess the notes you have taken in class. While seeing the presentations of other students will contribute to your understanding of a given statement, in order to successfully complete this course, it is important that you put in the effort to actually prove and understand each exercise yourself. The expectation is that through this process you will build sufficient confidence in your mathematical capabilities, which in turn should reflect in progressively more mature presentations.
Each presentation will be graded on a 0-3 scale that measures the difficulty, quality, and correctness of each presentation. The grading scale is roughly as follows:

0 = no progress toward a correct proof
1 = completely correct and well written proof of a trivial exercise
1 = some good ideas towards a non-trivial exercise, but incomplete proof
2 = completely correct and well written proof of a non-trivial exercise
2 = good work towards a difficult exercise, but some math or writing errors
3 = completely correct work and well written proof of a difficult exercise

Besides the correctness of the mathematical content, the quality of a presentation is based upon being able to explain your method clearly so that the audience can follow your work, writing in legible and correct English, and satisfactorily answering questions from the audience. I strongly encourage you to write down on paper the proof of the problem/statement to be presented very carefully, by using complete sentences that provide clear and concise explanations. The time at the board should NOT be spent on deciphering your notes!
You can discuss the text and class notes with other students. However, it should be a matter of honor not to use as your class presentation a problem for which you had substantial help from someone else (including me). To reiterate: any proof presented at the board must be essentially done by the one presenting it.

Advice for a successful experience:
- A passing grade requires good understanding of the theoretical concepts introduced (see also Classes and Grading).
- Read the notes.
- When in class: pay attention and be an active participant in the discussions; if there is something unclear in the argument presented, ask about it until you feel you received a satisfactory answer from the presenter.
- You can and should ask me questions during my office hours. My answers will almost always be hints or ideas for you to try further so that you get over certain difficulties you may encounter.

Classes
There is no penalty for missing classes. Be warned however that your success in this class highly depends on your continuous active involvement. Mastering the material of this course is a gradual process. Studying only a few days before the exam and skipping class because you have nothing to present is a really bad idea. Do not yield to the temptation of putting off work and getting behind with the material. This is a guaranteed recipe for failure.

Student Learning Objectives
Math 312 is about proving various statements in elementary analysis. This course will help you achieve student learning outcomes of the mathematics department:

1) Understand the importance of abstraction and rigor in mathematics, ability to construct complete proofs and to critically examine the correctness of mathematical work and logical arguments.

2) Communicate mathematical results and arguments clearly, both orally and in writing.

More specifically, upon completion of the course you are expected to be able to construct proofs of statements involving the topics below and clearly present them at the blackboard:
- the properties of real numbers and its important subsets of integer and rational numbers
- the notions of countable set and uncountable set
- the completeness axiom and the notions of infimum and supremum
- definitions related to real sequences, such as boundedness, convergence, and Cauchy property
- the basic concepts of topology on the real line and in the plane
- the $\epsilon - \delta$ definition of continuity
- basic facts about continuous functions defined on a closed bounded interval.

Exams
There will be two in-class exams on the following Fridays: February 5 and March 4. The final exam, scheduled for Monday, March 14, 8-10 AM, is comprehensive.
Hand written solutions to exam questions will be posted outside my office after each examination.

**Grading**

Class presentations: 45%, In-class exams: 15% each, Final exam: 25%

The formula that computes the percentage for the class presentations (CP) is

\[ CP = 45 \min \left\{ \frac{P}{P_{av}}, 1 \right\}, \]

where \( P \) is the total number of points accumulated by you during the quarter, while \( P_{av} \) is the class average.

Letter grades will be assigned according to the following percentage scale:
A (90–100), A- (86–89), B+ (82–85), B (78–81), B- (74–77), C+ (70–73),
C (66–69), C- (62–65), D+ (58–61), D (54–57), D- (50–53), F (0–49).

**Course policies**

If some health or family emergency would prevent you from missing an exam, you should contact me before the exam and I will make alternate arrangements. Once you take an exam, the score is recorded and cannot be adjusted or replaced under any circumstances.

**Incomplete Grades/Academic Dishonesty**

University guidelines as found in the *Bulletin* will be followed.