



Department of Mathematics, Computer & Information Science
FALL 2019

MA 3520 ♦ TRANSITIONS TO ADVANCED MATHEMATICS

Instructor: Frank Sanacory

Email: sanacoryf@oldwestbury.edu

Office: NAB 2014

Office Hours: Tuesday and Thursday 1:00-2:30

Website: sanacory.net

TEXTBOOK: **Mathematical Proofs: A Transition to Advanced Mathematics**, Fourth Edition, by Chartrand, Polimeni, Zhang, Pearson Publication, 2018, ISBN: 978013474675-3.

PREREQUISITES: Grade of C or higher in Calculus II (MA2320) and Discrete Mathematics (MA3030)

COURSE DESCRIPTION: An introduction to concepts commonly used in advanced mathematics with an emphasis on writing proofs. Topics include logic, set theory, relations, functions, and cardinality as well as selected topics from other areas of advanced mathematics such as number theory, abstract algebra, topology, and real analysis.

GOALS & OBJECTIVES: The main goal of this course is to prepare students for higher level courses in mathematics. This is done by engaging students in problem solving techniques and mathematical reasoning that presage higher level topics. Through examples and exercises, students will develop their mathematical reasoning ability -the ability to read and write proofs. The mathematical reasoning is practiced on fundamental topics that are needed for success in advanced mathematics courses. These topics include sets, relations, functions, properties of numbers, and cardinalities of sets. After successful completion of the course students should be able to demonstrate the ability to write mathematical proofs that are convincing, readable, notational consistent, and grammatically correct.

COURSE EVALUATION & GRADING:

Tests (two for 25 points each)	50%
Final	35%
Homework and written assignments	15%

A 93-100	B+ 87-89	C+ 77-79	D+ 67-69	
A- 90-92	B 83-86	C 73-76	D 63-66	F 0-69
	B- 80-82	C- 70-72	D- 60-62	

ACADEMIC INTEGRITY POLICY

As members of the Old Westbury community, students are expected to adhere to standards of honesty and ethical behavior. Plagiarism and other types of academic dishonesty are condemned at all academic institutions. These acts detract from the student's intellectual and personal growth by undermining the processes of higher learning and the struggle with one's own expression of ideas and information.

Good academic procedure requires giving proper credit when using the words or ideas of others.

Plagiarizing means "presenting somebody else's words or ideas without acknowledging where those words and ideas come from" (Ann Raimés, *Keys for Writers*, 7th ed., p.135). Examples include:

- copying material from the Internet or other sources and presenting it as one's own
- using any author's words without quotation marks; using any quotation without credit
- changing any author's words slightly and presenting them as one's own
- using ideas from any source (even in one's own words) without proper credit
- turning in any assignment containing material written by someone else (including tutor or friend); buying work and submitting it as one's own
- submitting the same assignment in more than one class without permission of the instructor

Know what plagiarism is and how to avoid it; for guidance see Raimés or any other college writing handbook.

Other types of academic dishonesty include unauthorized collaboration or copying of students' work (cheating); falsifying grades or other assessment measures; destroying the academic work of another student; the dishonest use of electronic devices; and others. When detected and verified, plagiarism and other academic dishonesty will have serious consequences.

Please note: In this matter, ignorance of the Academic Integrity Policy is never an acceptable excuse.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES:

If you have or suspect you may have a physical, psychological, medical or learning disability that may impact your course work, please contact Stacey DeFelice, Director, The Office of Services for Students with Disabilities (OSSD), NAB, 2065, Phone: 516-628-5666, Fax (516) 876-3005, TTD: (516) 876-3083. E-mail: defelices@oldwestbury.edu. The office will help you determine if you qualify for accommodations and assist you with the process of accessing them. All support services are free and all contacts with the OSSD are strictly confidential. SUNY/Old Westbury is committed to assuring that all students have equal access to all learning activities and to social activities on campus.

TUTORIAL: Drop-in tutorial is available in the Mathematics Learning Center.

TOPICS TO BE COVERED

TEXTBOOK: *Mathematical Proofs: A Transition to Advanced Mathematics*, Fourth Edition, by Chartrand, Polimeni, Zhang,

Review of Proof Methods

- Mathematical Induction
- Relations
- Equivalence Relations
- Properties of Relations
- Equivalence Relations
- Properties of Equivalence Classes

Congruence Modulo n
The Integers Modulo n

Functions

The Definition of Function
One-to-one and Onto Functions
Bijective Functions
Composition of Functions
Inverse Functions
Permutations
Cardinalities of Sets
Numerically Equivalent Sets
Denumerable Sets
Uncountable Sets
Comparing Cardinalities of Sets
The Schröder-Bernstein Theorem

Number Theory

Divisibility Properties of Integers
The Division Algorithm
Greatest Common Divisors
The Euclidean Algorithm
Relatively Prime Integers
The Fundamental Theorem of Arithmetic

Group Theory

Binary Operations
Groups
Permutation Groups
Fundamental Properties of Groups
Subgroups
Isomorphic Groups

Calculus

Limits of Sequences
Infinite Series
Limits of Functions
Fundamental Properties of Limits of Functions
Continuity
Differentiability

Topology (Time permitting)

Metric Spaces
Open Sets in Metric Spaces
Continuity in Metric Spaces
Topological Spaces
Continuity in Topological Spaces