

**Mathematics 300**  
**Math 300: Mathematical Foundations**

Instructor: Dr. Wei-Chi Yang

Class Meeting Days and Times: **Tuesday and Thursday 8:00-9:15 am. If we switch to Zoom, the URL is <https://radford.zoom.us/j/2868245247>.**

Office Location: WH208

Office Phone Number: (540) 831-5232

Office Hours: by appointments through email.

E mail: [wyang@radford.edu](mailto:wyang@radford.edu)

Prerequisites: MATH 172 and MATH 260

Textbook: Please check with RU bookstore

Credit Hours: (3)

A first course in the foundations of modern mathematics. The topics covered include sentential calculus, set theory, the number system, induction and recursion, functions and relations, and computation. The methods of proof and problem solving needed for upper-division coursework and the axiomatic basis of modern mathematics are emphasized throughout the course.

#### Detailed Description of Course

Course content includes:

1) Sentential Calculus:

- a. Logical symbols and logical connectives.
- b. Sufficient condition, necessary condition and if and only if.
- c. The use of truth tables and applications.
- d. Tautologies, and tautological consequences.
- e. Validity and satisfiability.
- f. Principles for sentential calculus.
- g. Using the language of predicate calculus in mathematical proofs.

2) Fundamental Set theory:

- a. Definitions of sets, subsets, elements of sets.
- b. Standard notation of sets and set operations
- c. Some common number sets.
- d. Ordinality and cardinality.

3) Functions and Relations:

- a. General definition of relations on sets.
- b. General features and special kinds of relations.
- c. Partial orders, equivalence relations. and partitions.

- d. Basic properties of functions.
- e. Common types of functions.

4) The Number System:

- a. Natural Numbers, Integers, and Rational Numbers.
- b. Ordinality, cardinality, and countability of Rational Numbers.
- c. The Real Numbers; irrationality, and the non-denumerability of the reals.
- d. The least Upper Bound and Greatest Lower Bound of a set
- e. Recursion on the set of Natural Numbers.

5) Common Methods of a Mathematical Proof

- a. Proof by induction
- b. Proof by contradiction
- c. Dis-proof by a counter example.

**Assessment Measures**

Assessment measures include a final examination and may include any of the following: homework assignments, in-class tests, quizzes, and final exam.

Tests and Exam: No make-up exams will be allowed unless a proper document is provided.

**Homework and Quizzes (40%)**

**Tests (40%)**

**Final (20%)**

**Grading: The following grading scale will be used:**

90-100 = A ; 80-89 = B ; 70-79 = C ; 60-69 = D ; 0-59 = F

Note. A = 100-93, A- = 92.9-90, B+ = 89.9-87, B = 86.9-83 and so on.

**Honor System** All tests and the final must be pledged. The Honor Code will be strictly enforced in this course.

From Center for Accessibility Services (CAS): Students seeking academic accommodations under the Americans with Disabilities Act must register with the Center for Accessibility Services (CAS) to determine eligibility. Students qualified for academic accommodations will receive accommodation letters and should meet with each course professor during office hours, to review and discuss accommodations. To begin the registration process, complete a Student Registration Form and submit documentation to PO Box 6902, Radford, Virginia 24142, or deliver to the Russell Hall, Room 325, by fax to 540-831-6525, or by email to [cas@radford.edu](mailto:cas@radford.edu) (See documentation guidelines). For more information, visit the Center for Accessibility Services (CAS) website or call 540-831-6350.

**IMPORTANT:** If you are not on the class roll that comes out after the last add date, immediately check your schedule at a terminal and start attending the proper section. For no foreseeable reason (computer

and registrar personnel mistakes included) will you be allowed to stay in the wrong section or to drop a section for which you are actually enrolled after the last drop date. By simply attending a section you will not be placed on its roll.