Tompkins Cortland Community College

Master Course Syllabus

Course Discipline and Number: MATH 216 **Year: 2024-2025**

Course Title: Discrete Mathematics **Credit Hours: 4**

I. Course Description: This is an introductory course in Discrete Mathematics with emphasis on Computer Science applications. Topics include set theory, functions and relations, logic, methods of proof, induction and recursion, number theory, counting methods and discrete probability, graph theory, trees, and finite state automata. MATH 216 fulfills the SUNY General Education Mathematics (and Quantitative Reasoning) Knowledge and Skills area. Prerequisites: C or better grade in MATH 120, MATH 122, or as determined by placement; prior completion of, or concurrent enrollment in, ENGL 100. 4 Cr. (4 Lec.) Spring semester.

II. Additional Course Information:

1. This is a required course for the Computer Science AS and is a recommended course for the Mathematics concentration of the Liberal Arts and Sciences: Adolescence Education (Teacher Education Transfer) A.S. It also satisfies a liberal arts and sciences elective or SUNY General Education Mathematics elective requirement.
2. Knowledge of a programming language or some prior programming experience is beneficial.

III. Student Learning Outcomes

Upon successful completion of this course, students will be able to:

1. Use symbolic language to represent statements, statement forms, logic circuits, and discrete structures.
2. Apply rules of inference, theorems, number theory, and laws of algebra to construct valid arguments and mathematical proofs.
3. Work with sets, properties of sets, functions, and relations on sets.
4. Apply graph theory, trees, and FSA design to discrete applications.
5. Use combinatorics and discrete probability in a variety of applications.

IV. Tompkins Cortland Institutional Learning Outcomes; Program Learning Outcomes; SUNY General Education Competencies and Knowledge and Skills Areas

Tompkins Cortland ILOs

Complete this section for “service” courses only (e.g., courses that are required of all students; courses that are not program specific but satisfy liberal arts requirements; or commonly used in multiple academic programs to meet non-program-specific requirements). Check only Institutional Learning Outcomes (ILOs) that are meaningfully developed and assessed in this course. For each ILO chosen, include the SLO to which it aligns.

Students will:

☐ Communicate effectively, in oral and written forms, taking into consideration audience and purpose.

☐ Apply principles and methods of scientific inquiry and quantitative reasoning appropriate to their discipline.

☐ Use information, critical thinking, and the creative process to solve problems and reach conclusions.

☐ Use technology appropriate to their discipline.

☐ Describe the ways in which social, economic, or environmental sustainability depends on their own and the collective contributions of a diversity of ideas and people.

Program Learning Outcomes

Complete this section for program-specific courses (e.g., those that share the same discipline code as the academic program or satisfy requirements in related programs). List the academic program(s) here and note which Student Learning Outcomes align to specific Programmatic Learning Outcomes. Please see the MCS Instructions for more details.

Specify the Academic Program: **Computer Science – A.S**.

PLO #4 Demonstrate and apply problem solving and mathematical abilities appropriate for computer-based solutions.

SLO #1: Use symbolic language to represent statements, statement forms, logic circuits, and discrete structures.
SLO #2: Apply rules of inference, theorems, number theory, and laws of algebra to construct valid arguments and mathematical proofs.
SLO #3: Work with sets, properties of sets, functions, and relations on sets
SLO #4: Apply graph theory, trees, and FSA design to discrete applications.
SLO #5: Use combinatorics and discrete probability in a variety of applications.

SUNY General Education Competencies

If this course assesses a SUNY GEN ED Competency, check all that apply and indicate which course outcome(s) address each checked item:

☐ CRITICAL THINKING & REASONING- Students will:

a. clearly articulate an issue or problem;
b. identify, analyze, and evaluate ideas, data, and arguments as they occur in their own or others' work; acknowledge limitations such as perspective and bias; and
c. develop well-reasoned (logical) arguments to form judgments and/or draw conclusions.

☐ INFORMATION LITERACY - Students will:

a. locate information effectively using tools appropriate to their need and discipline; evaluate information with an awareness of authority, validity, and bias; and demonstrate an understanding of the ethical dimensions of information use, creation, and dissemination.

☒ SUNY GENERAL EDUCATION KNOWLEDGE AND SKILLS AREA(s): **Mathematics (and Quantitative Reasoning)**
For courses that are approved to meet one (or more) of the ten SUNY General Education Knowledge and Skills Areas, indicate which area the course fulfills, and which outcome(s) are aligned with the SUNY outcomes for that area:

Students will demonstrate mathematical skills and quantitative reasoning, including the ability to

- interpret and draw inferences from appropriated mathematical models such as formulas, graphs, tables, or schematics;

Course SLO(s):
SLO #1: Use symbolic language to represent statements, statement forms, logic circuits, and discrete structures.
SLO #4: Apply graph theory, trees, and FSA design to discrete applications.

- represent mathematical information symbolically, visually, numerically, or verbally as appropriate; and

Course SLO(s):

SLO #1: Use symbolic language to represent statements, statement forms, logic circuits, and discrete structures.
SLO #2: Apply rules of inference, theorems, Number Theory, and laws of algebra to construct valid arguments and mathematical proofs.
SLO #3: Work with sets, properties of sets, functions, and relations on sets
SLO #4: Apply graph theory, trees, and FSA design to discrete applications.

- employ quantitative methods such as arithmetic, algebra, geometry, or statistics to solve problems.

Course SLO(s):

SLO #2: Apply rules of inference, theorems, number theory, and laws of algebra to construct valid arguments and mathematical proofs.
SLO #3: Work with sets, properties of sets, functions, and relations on sets
SLO #4: Apply graph theory, trees, and FSA design to discrete applications.
SLO #5: Use combinatorics and discrete probability in a variety of applications.

☐ This course does not address any of the above Tompkins Cortland ILOs, PLOs, or SUNY General Education Competencies or Knowledge and Skills Areas.

V. Essential Topics/Themes

1. Logic of Compound Statements and Digital Logic
2. Logic of Quantified Statements
3. Number Theory and Methods of Proof
4. Sequences and Mathematical Induction
5. Set Theory
6. Functions and Relations
7. Counting and Probability
8. Graphs and Trees
9. Regular Expressions and Finite State Automata

VI. Methods of Assessment/Evaluation

Method	% Course Grade
1. Unit Tests	20-50%
2. Homework, Readings, Pre-Lecture Assignments	0-30%
3. Midterm	20-40%
4. Final Exam	20-40%

VII. Texts – ☐ Required ☒ Recommended ☐ Used for more than one course (list courses)

High school instructors may consult with staff in the CollegeNow office for additional information and guidance.

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1. *Discrete Mathematics with Applications*, Susanna S. Epp., 4th Edition, © 2004 Brooks-Cole Publishing Co.	☐

Editions listed are current as of date of syllabus. More recent editions may be used.

VIII. Bibliography of Supplemental Materials

1. *Discrete Mathematics with Proof.* Eric Gossett, © 2003, Prentice Hall. ISBN 0-13-066948-2
2. *Discrete Mathematics*. 6th edition, Richard Johnsonbaugh, © 2005, Prentice Hall. ISBN 0-13-117686-2
3. *A Spiral Workbook for Discrete Mathematics*. Harris Kwong, SUNY Fredonia, Open SUNY Textbooks
4. *A course in Discrete Structures*. Rafael Pass & Wei-Lung Dustin Tseng, Cornell University
5. *Mathematical Reasoning, Writing, and Proof* V3. Ted Sundstrom, © 2022, Grand Valley State University, CC-BY-NC-SA

Editions listed are current as of date of syllabus. More recent editions may be used.

IX. Other Learning Resources

Audiovisual: None specified
Electronic: www.cengage.com/math/epp
Other: *Principles and Standards for School Mathematics*. National Council of Teachers of Mathematics. ISBN 0-87353-480-8. *Student Solutions Manual and Study Guide*. ISBN-10: 0-495-82613-8; ISBN-13: 978-0-495-82613-2

Attendance Policy: *To maintain good grades, regular attendance in class is necessary. Absence from class is considered a serious matter and absence never excuses a student from class work. It is the responsibility of all instructors to distribute reasonable attendance policies in writing during the first week of class. Students are required to comply with the attendance policy set by each of their instructors. Students are not penalized if they are unable to attend classes or participate in exams on particular days because of religious beliefs, in accordance with Chapter 161, Section 224-a of the Education Law of the State of New York. Students who plan to be absent from classroom activity for religious reasons should discuss the absence in advance with their instructors. See college catalog for more information.*

Services for Students with Disabilities: *It is the College's policy to provide, on an individual basis, appropriate academic adjustments for students with disabilities, which may affect their ability to fully participate in program or course activities or to meet course requirements. Students with disabilities should contact the Coordinator of Access and Equity Services, to discuss their particular need for academic adjustments. All course materials are available in alternate formats upon request.*

Academic Integrity: *Every student at Tompkins Cortland Community College is expected to act in an academically honest fashion in all aspects of his or her academic work: in writing papers and reports, in taking examinations, in performing laboratory experiments and reporting the results, in clinical and cooperative learning experiences, and in attending to paperwork such as registration forms.*
Any written work submitted by a student must be his or her own. If the student uses the words or ideas of someone else, he or she must cite the source by such means as a footnote. Our guiding principle is that any honest evaluation

of a student's performance must be based on that student's work. Any action taken by a student that would result in misrepresentation of someone else's work or actions as the student's own — such as cheating on a test, submitting for credit a paper written by another person, or forging an advisor's signature — is intellectually dishonest and deserving of censure.

Several degree programs offer student learning opportunities (such as internships, field work, and clinical experiences) outside the standard classroom setting. As part of the learning process, students must understand and engage in conduct that adheres to principles guiding employment within the professional workplace. These behaviors include, but are not limited to, academic integrity, accountability, reliability, respect, use of appropriate language and dress, civility, professional ethics, honesty, and trustworthiness. Disciplinary action may be initiated for inappropriate conduct occurring while participating in any course-related project or event.