

MA508A
Discrete Mathematics for Teachers
Fall 2006
Thursday 6:30-9:00pm.

Mathematicians have tried in vain to this day to discover some order in the sequence of prime numbers, and we have reason to believe that it is a mystery into which the human mind will never penetrate.

---*Euler, Leonhard (1707-1783) quoted in G. Simmons Calculus Gems, New York: McGraw Hill Inc., 1992.*

Instructor: Dr. Terri Magnus, Regis Hall

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Office hours: Please let me know whenever you need help. You are invited to stop by my office whenever I am there or make an appointment. My regular hours are T10am-12pm, 5-6 pm, W 9:30-11:30am, and R4-6pm in Regis Hall. I will also respond to questions via e-mail.

Textbooks: Custom version excerpted from *Discrete Mathematics and its Applications*, 6th edition, by Kenneth Rosen, WCB/McGraw-Hill (2007).

Catalogue course description: An introduction to the mathematical theory underlying computer science including propositional calculus, proof writing, recursion, algorithms, Boolean matrices, binary relations and their properties, functions, graphs, networks, and trees. Prerequisites: Calculus II and Linear Algebra.

What is Discrete Mathematics? In mathematics, the word “discrete” means individually distinct, not continuous. The set of integers is a discrete set, but the set of all real numbers is not.

Instructor’s overview: Discrete mathematics is an important transition course, not only for the computer scientist but also for the mathematics major and future mathematics educator. In this course you will study a wide range of mathematical topics. Some topics may be new to you; others may be a deeper study into familiar topics. All topics have appeared (though not at as deep a level) in some high school mathematics texts. Throughout the course, you will be learn how to write and think mathematically. You will go beyond computations to developing conjectures and proving theorems. This course lays the foundation for advanced mathematics courses and satisfies most of the New Hampshire Department of Education Discrete Mathematics requirements for secondary certification in mathematics education.

Course Objectives:

- To introduce students to the fundamental notation and concepts of discrete structures
- To engage students in mathematical thinking, reading, writing, and exploration
- To develop techniques for proving things about and manipulating discrete mathematical structures
- To learn how to develop algorithms and verify their correctness
- To develop an awareness and appreciation of formal axiomatic systems and their applications
- To introduce students to combinatorial methods and graph theory
- To develop students’ ability to write clearly and concisely about mathematical ideas and problem solutions
- To prepare students for advanced courses in mathematics
- To prepare students to teach topics in discrete mathematics in secondary mathematics classrooms

Teaching Strategies:

- Student reading and writing of mathematics
- Lecture and large group discussions with an expectation of student participation and questioning
- Active student engagement in group work, discussions, problem solving, and constructive critique
- Homework assignments which encourage both review and further growth in understanding
- In-class activities which require analysis and synthesis of concepts
- Project to encourage students to apply course learning to secondary classroom experience

Course Requirements:

- Homework, completed and self-evaluated, as preparation for quizzes and tests.
- Homework requiring proof-writing or multi-step problem-solving will be submitted for a grade.

- Reading of chapters in text.
- Attendance, active participation, and engagement in full-class, small-group, and individual activities.
- Paper
- Two tests, and final examination

Tests: Tests will be scheduled on **October 12** and **November 16**. Final exam is cumulative and will be held on **Thursday, December 14**, from 6:30-9:00 pm. Tests will take up approximately one-half of a class period.

Quizzes will be given approximately every two weeks. The quizzes will be based on assigned homework and key definitions. Although most of the homework problems will not be graded, completion of the homework assignment will “guarantee” a quiz grade of at least 70%. Quizzes will typically take place at the beginning of class meetings.

Project: A description of the project will be described in a separate handout.

Homework assignments will consist of two types:

- A few non-routine, multi-step problems will be assigned to be submitted and graded while a list of routine problems will be recommended for preparation for the quizzes. Submitting the latter at the time of the quiz will ensure that your quiz grade will be no lower than 70%.
- Problems to be graded should be completed by the beginning of the class after they are announced. You are encouraged to visit or e-mail the instructor if you have any problems completing the homework. You may work with classmates so long as you are careful to write up your solutions individually without copying each other’s words.

Assessment and computation of grades:

Submitted homework	15%
Quizzes	15%
Inclass activities, E-mail assignments	5%
Paper	10%
Tests (two)	30%
Final examination	25%

Classroom Policies:

Workload: This course does require a significant amount of work outside of class. Homework problems in MA508 will likely require more time and thought than problems in previous mathematics courses. Scanning the sections in the text and a more thorough reading after class is encouraged. Major definitions should be understood and memorized. Expect to study discrete math four to ten hours outside of class per week. If you’re spending more time, talk to the instructor outside of class. She may be able to help you focus your energies more efficiently and productively as well as help you with your difficulties.

Attendance and Punctuality: Active participation requires attendance and arrival to class in time to be prepared for work when the class period begins. You are expected to attend all classes. Much of the learning will take place in classroom activities that cannot be duplicated easily outside of class. If you miss class, you are responsible for doing all classroom activities you missed, getting the notes from a classmate, and turning in all work on the day it is due. If you miss more than two classes, your absence will be reported to the registrar and you must meet with the professor to discuss the advisability of your remaining in the course for the remainder of the semester. Students who miss three classes may receive a failing grade in the course. If you anticipate that job-related duties or prior commitments will cause several absences, please discuss the matter with the instructor outside of class.

Making up tests: If unavoidable circumstances keep you from attending class on the night of the test, you must contact the instructor promptly to explain the absence and, if approved, schedule a make-up. Documentation of the reason for absence is advised. Make-up quizzes, if approved by the instructor, must be completed prior to the next week’s class.

Cell phones: Cell phones should not be used during class. If you need to be available for emergency phone calls, please set the ringer to silent or vibrate. Leave the room to answer.

Calculators: Calculators are allowed, but you may find you rarely need one.

Asking questions: Questions are encouraged both in and out of class. All students have a right and responsibility to ask questions and give insight related to the understanding of course content. However, the instructor is also expected to cover a significant amount of material to prepare you for future coursework. For this reason students having a large number of questions or significant difficulty with a topic are expected to seek help from the instructor outside of class. It is in your best interest to ask questions as soon as you have discovered and confirmed that you do not understand something.

Honesty policy: All work turned in on tests, quizzes, and the final must be entirely your own. Behavior contrary to this will result in a grade of F on the test. Serious infractions may result in an F for the course. Similarly, the paper you write for your project must not be plagiarized. See library discussion on plagiarism. Regarding homework, the instructor will not give you credit for any work that is copied from another source (from a classmate, instructor, a text, the answer key, web assistance, tutor, etc.). Take notes while getting help, but put aside the notes as you attempt to do the problems on your own.

Working in groups: Participation in large and small group discussions in class is required and assessed for active engagement and contribution. In addition, you are encouraged to study together outside of class. The work you turn in should be entirely your own, though.

E-mail: E-mail is a great way to keep in touch during the days we don't meet. You will be expected to acquire e-mail access so that the instructor can notify you of any announcements. You will also be encouraged to dialogue with the instructor and other students via e-mail as a means of improving your mathematical writing and understanding. The instructor will require at least one draft proof via e-mail and welcomes others.

Netiquette: You are encouraged to exercise good writing and social behavior when corresponding via e-mail. Too often I receive e-mails from students that are difficult to comprehend. Reread your message before hitting send to make sure that the message will not be misinterpreted. Use complete English (not IM) sentences. Avoid criticizing other individuals especially in a public forum. Feel free to use the Equation editor (Insert – Object - Microsoft Equation) on the pulldown menu (full installation of MS Word) or to write pseudo math type (sqrt(4+x^3) in place of $\sqrt{4+x^3}$). You may need more parentheses than usual to make your meaning clear.

Evaluation Criteria for Homework and Quizzes

10 (A)	Excellent work. You appear to have a very good understanding of the main concepts and procedures in the assignment. Your answers are thorough, well written, and show insight. Proofs are logical, thorough, and precise. Papers are neat and well organized.
9 (B/AB)	Above average work. You completed the assignment and appear to have a good understanding of most of the main ideas or concepts. You may have made a few errors, but not many. Proofs show understanding, are logical, and are for the most part complete, but may need some editing.
8 (BC)	Satisfactory work. You completed most of the assignment and understand some of the main ideas, but need work in other areas. Some of the problems may have been started, but unfinished. Proofs show some sense of understanding, but you may need to work on style, completeness, logical order, and/or precision. Look over the areas where you had trouble and seek help from the instructor. You may need to be more thorough in your work.
7 (C)	Although you made a good attempt at the assignment, your work shows a lack of understanding, sloppiness or carelessness, or inattention to detail. You may need to include more reasons or steps in your answers. Your proofs are sketchy, disorganized, or lack insight. If you had trouble on the assignment, seek help from the instructor. You may have misread the directions for the assignment. Proofs may have been not attempted, incomplete, or showed a lack of understanding and direction.

5 or below (F)	Incomplete or poor work. You did not complete most of the assignment. The work that was completed was not well done. You need to include more than just answers in your solutions. If you need help getting started, please ask!
0 (F)	Not enough was done on the assignment to get credit. Perhaps no paper was submitted.
R (hw only)	Redo for credit. You had real difficulties on this assignment and I feel that you would learn a lot from redoing the assignment within the week. Get help with the assignment!

Bibliography:

Albertson, M. & Hutchinson, J., *Discrete Mathematics with Algorithms*, New York: John Wiley & Sons, 1988.
 Chartrand, Gary, *Introductory Graph Theory*, New York: Dover Publications Company, 1977.
 Doerr, A. & Lavoisier, K., *Applied Discrete Structures for Computer Science*, Chicago: Science Research Associates, 1985.
 Epp, Susanna S., *Discrete Mathematics with Applications*, Boston: Brooks/Cole Publishing Company, 1995.
 Fletcher, P., Hoyle, H., and Patty, C., *Foundations of Discrete Mathematics*, Boston: Prindle, Weber, & Schmidt-Kent Publishing Company, 1991.
 Graham, Ronald L., Donald E. Knuth, and Oren Patashnik, *Concrete Mathematics*, Reading, MA: Addison-Wesley, 1989.
 Grimaldi, R., *Discrete and Combinatorial Mathematics: An Applied Introduction*, Reading, MA: Addison-Wesley, 1992.
 Hofstadter, Douglas R., *Godel, Escher, Bach: An Eternal Golden Braid*, New York: Basic Books, 1979.
 Kolman, Busby, and Ross, *Discrete Mathematical Structures*, 3rd ed., New York: Prentice Hall, 1996
 Mattson, H.F. Jr., *Discrete Mathematics with Applications*, New York: Wiley and Sons, 1993.
 Solow, Daniel, *How to Read and Do Proofs*, New York: John Wiley & Sons, 1982.

Assignments:

Required homework should be completed in the week following the class in which the material was discussed. This homework should be written up neatly on loose-leaf paper, stapled, to be submitted for grading. At the top of the first page write your name and the heading "Required Homework for Sections ...". You will normally be allowed one additional week to rewrite the assignment if class discussions of problems improved your understanding, but the instructor reserves the right to eliminate the rewrite period if it appears students are not making a serious attempt at the problems in the first week. In general, homework proofs will not be done on the board; you are encouraged to work with the instructor during office hours or via e-mail if you have questions on assigned proofs.

Quiz Insurance will not be graded, but will give you practice on some of the other types of problems that may appear on quizzes and tests. A quiz may cover material that was discussed in the previous class or all material covered since the last quiz or test. Doing these problems is optional, but you should at least read the problems so that you can assess whether practice is needed. Answers for quiz insurance will normally be provided via the internet: Send an e-mail reminder to the professor if she forgets! You may use a section of your notebook or loose-leaf paper for quiz insurance. Gather them together (again your name and the heading "quiz insurance" helps) so that you can show the instructor during the quiz. The worst you can get on a quiz if you do the insurance is 70%. Copying of answers does not count as quiz insurance. Show your own thinking.

Section	Topics	Required	Quiz Insurance
1.1	Logic	6a-e,9bceg,18a-e,23a,29a	1,8abcef,11,12,14,15,27d,28c,38
1.2	Equivalence	8bd,23,26	5,10a,31
1.3	Predicates and Quantifiers	7abd,9,14,22bcd,34,51,53	4,6,11,23ace,35,52
1.4	Nested Quantifiers	4be,8,28a-f, 38bc	1,7bcd,31,38d
1.5	Rules of Inference	6, 23	2,17,20
1.6	Intro to Proofs	Submit one to three attempts to the instructor via e-mail for feedback by the Monday after this section is covered. Write up all proofs as homework: 2, 5, 9, 16, 23, 32	7, 15, 21, 35
1.7	Proof Methods	E-mails welcome; homework required: 2, 15, 34	1,12
2.1	Sets	27,30	1a, 2a,3,4,9,18,20,23,32
2.2	Set Operations	2,5,15ab,27ab,29bde,36 bonus: 44	1,3,25acd,29ac,32,48a
extra	Inclusion Exclusion	handout	
2.3	Functions	4,15,16ad,28,29,choose two of 20, 36b,66,68 bonus: 16bc	1,2,5,9,10,11,17a,26,32, 64a,65
2.4	Sequences and sums	7,10(choose four of the problems in 10), 15d, 17a,19,20,32 bonus: 37	1,5,13b,14b,17c,27
3.1	Algorithms	2,4,8,9	1,11,13
3.2	Growth of Functions	4,7,9,17	2,14
3.3	Complexity		
3.4	Integers and Division	6,20,23,24,31c	10abcd,16,19,32
3.5	Primes and GCDs	5,11,12,18,19,31	2,17,20abde,22abde,26
3.6	Integers and algorithms	13,17,22,24e	1,3,5,9
3.8	Matrices	10,19,24	2a,3ab,29,31
4.1	Mathematical Induction	6,11,18,23,43,52	47-50
4.2	Strong induction	12	
4.3	Recursion	2,5cd,18,25,28a	5ab,7,23,38
5.1	Counting	12,20,31,35,41	2,3,23
5.2	Pigeonhole	3,8,31	
5.3	Permutations, Combinations	12,22,25abcdehi	3,4,9,13,19
5.4	Binomial coefficients	4	
6.1	Probability	10,14,32	7,9,25a,31
8.1	Relations	6,52,59ab	1ade,3,25,31,39
8.3	Representing relations	8	3b,9,13,27

8.5	Equivalence	8,36,44,48a	1,3,21,29
9.1	Graphs	2,30	19,31
9.2	Types of graphs	18,20abde	1,5,13,21,35,51
9.3	Representing graphs	36,38	1,3,5,7,25,41,57
9.4	Connectivity		1,11,31
9.5	Euler paths		3,5
extra	Trees		handout

MA508A Rubric for Project Option 1

	A	B	C	F
Addressing the Assignment	Examples encourage reasoning and proof yet fit naturally with mathematical content of course. The examples clearly support the stated standards.	The examples chosen meet most but not all of the criteria described for an A. Perhaps you have not fully supported the claim that an example is a good example of the standard you claim it supports.	Problem meets many, but not all, of the criteria in A or the connection to standards is mediocre. Examples chosen may be too easy, too hard, uninspired, or too weak to promote mathematical and reasoning objectives.	Examples do not encourage students to use or develop reasoning and/or proofwriting skills as described in the standards. Connection between examples, course content, and the standards may be weak.
Clarity	Examples and their connections are clear and easy for the reader to understand. Precise and concrete language is used throughout. No word choice errors or awkward sentences.	Paper is for the most part clear and easy to read. Most examples are clearly defined and the connections between the standards and the examples have been identified. Minimal word choice errors or difficult sentence structures.	The paper is difficult to read in some places. Some connections or examples may be under developed or difficult to understand. You may have used vague language.	You need to work on your writing style. You may have made minimal references to examples and standards without demonstrating a connection. You have not conveyed your meaning to the reader.
Originality and Depth	Writer has gone beyond the basic assignment by one or more of the following: unique examples or a creative and effective demonstration of connections to reasoning. Discussion of examples and connections to standards is thorough and goes beyond what is discussed in the PSSM or textbooks. Citations are used only where appropriate.	The paper addresses the requirements, but does not go substantially beyond them. The discussions, while thorough, may lack personal insight.	A few standards have not been fully addressed or discussions are minimally adequate. Writer might frequently use citations without providing one's own insight.	Discussion is weak. Writer has not met many requirements fully. Writer tends to rely on material copied from other sources as opposed to providing own insight and creativity. The writer has not demonstrated a clear understanding of the standards or did not cover enough of them.
Organization	Information in paper is presented in a clear and logical manner. All project criteria are easy to find while maintaining a nice flow in the paper. Paragraphs are coherent and appropriately used. Paper has a strong introduction and conclusion.	There may be a few minor errors in paragraph structure and arrangement of content, but overall the paper is well written. Perhaps some references are unclear or some of the writing is choppy.	Presentation needs more coherence. There may be some errors in paragraph structure. Your style of writing might not generate interest in the topic. Introduction and conclusion may be weak.	Project is messy and disorganized. Connections between sections are unclear. Discussions lack coherent paragraph structure.
Mechanics	Spelling, grammar, vocabulary, and mathematical notation are correct. Paper is neat, double-spaced, and has consistent formatting. Only one side of each page is used.	Very few errors in spelling, grammar, vocabulary, or notation. Errors are minor and do not interfere with clarity of paper. Paper is neat, but may have some formatting inconsistencies.	Some, but not many, minor errors and very few major errors in mechanics. One or two may affect clarity. Paper may be sloppy or have inconsistent formatting.	Repeated minor errors or several major errors in spelling, grammar, vocabulary, or notation interfere with reading of paper. Sloppy paper. Inconsistent style.

Option 1 Paper	A	B	C	F
Topic	Lesson encourages reasoning and proof yet fits naturally with mathematical content of course. Activities allow for student creative reasoning. Expectations are appropriate for course and level.	The lesson chosen meets most but not all of the criteria described for an A. It promotes either the reasoning or content objectives well, but is not quite as strong in some areas. A good idea may need some revision to make it work for the described class.	Problem meets many, but not all, of the criteria in A or the appropriateness is mediocre. Lesson chosen may be too easy, too hard, uninspired, or too weak to promote mathematical and reasoning objectives.	Lesson does not encourage students to use or develop reasoning and/or proofwriting skills. Connection between lesson and course content may be weak.
Presentation of Lesson	Writer has clarified how the lesson will proceed. Connections to course content are made evident by the writer. Worksheet or oral instruction is appealing, clear, and understandable to the student. Selection of group structure and tools is appropriate for lesson. Contingency plans have been considered.	The writer presents has nice ideas for presenting the activity, but some of the plans have not been developed fully or may not be the best for the chosen course or lesson. Perhaps more specifics are needed.	Ideas for lesson are okay, but not adequately delineated. Your discussion of some of the items related to the lesson is either missing or too vague. You need to think more deeply about how the lesson might proceed in a secondary classroom and the questions students will have.	You may have selected an activity and course, but it is not clear how the activity would proceed. Wording of the lesson may be poor and hard to understand. You have not considered what might actually occur in a classroom.
Assessment	Writer has fully developed an assessment appropriate to lesson and objectives. Multiple approaches to reasoning have been considered. Assessment can be used for improvement of lesson, amending future lessons, or individual improvement of students.	Assessment plans are appropriate to lesson and objectives, but either the paper does not clearly convey how the assessment will be conducted and used or the assessment does not allow for some student approaches.	Plans for assessment are present, but are minimally developed. Some objectives or alternative approaches may have been overlooked. Assessment of reasoning skills may be minimal.	Plans for assessment are missing, too vague, or not directly connected to lesson and objectives. Alternative approaches have not been considered. Assessment of reasoning and proof skills may be missing.
Originality and Depth	Writer has gone beyond the basic assignment by one or more of the following: creation or revision of activities, creative and effective incorporation of reasoning into course, or more involved assessment. Discussion of activity, objectives, and assessment is thorough. Citations are used only where appropriate.	The paper addresses the requirements, but does not go substantially beyond them. Perhaps the lesson was revised, but discussion of assessment and connections to standards was simply adequate. Or the discussions, while thorough, may lack personal insight.	A few requirements have not been fully addressed or discussions are minimally adequate. Writer might frequently use citations without providing one's own insight. The writer failed to make explicit how the lesson helps students develop age appropriate reasoning and proof skills.	Discussion is weak. Writer has not met many requirements fully. Writer tends to rely on material copied from other sources as opposed to providing own insight and creativity. Lesson may be taken primarily from one source such as a book, journal article, curriculum guide, or a teacher's lesson plans.
Organization	Information in paper is presented in a clear and logical manner. All project criteria are easy to find while maintaining a nice flow in the paper. Paragraphs are coherent and appropriately used.	There may be a few minor errors in paragraph structure and arrangement of content, but overall the paper is well written. Perhaps some references are unclear or some of the writing is choppy.	Presentation needs more coherence. There may be some errors in paragraph structure. Your style of writing might not generate interest in the topic.	Project is messy and disorganized. Connections between sections are unclear. Discussions lack coherent paragraph structure.
Mechanics	Bullets and headings are consistent throughout. Spelling, grammar, and mathematical notation are correct.	Very few errors in spelling, grammar, bullets, or notation. Errors are minor and do not interfere with clarity of paper.	Some, but not many, minor errors and very few major errors in mechanics. One or two may affect clarity.	Repeated minor errors or several major errors in spelling, grammar, or notation interfere with reading of paper. Sloppy paper. Inconsistent style.

Option 2 Lesson Plan	A	B	C	F
Selection of Lesson	Lesson encourages reasoning and proof yet fits naturally with mathematical content of course. Activities allow for student creative reasoning. Expectations are appropriate for course and level.	The lesson chosen meets most but not all of the criteria described for an A. It promotes either the reasoning or content objectives well, but is not quite as strong in some areas. A good idea may need some revision to make it work for the described class.	Problem meets many, but not all, of the criteria in A or the appropriateness is mediocre. Lesson chosen may be too easy, too hard, uninspired, or too weak to promote mathematical and reasoning objectives.	Lesson does not encourage students to use or develop reasoning and/or proofwriting skills. Connection between lesson and course content may be weak.
Presentation of Lesson	Writer has clarified how the lesson will proceed. Connections to course content are made evident by the writer. Worksheet or oral instruction is appealing, clear, and understandable to the student. Selection of group structure and tools is appropriate for lesson. Contingency plans have been considered.	The writer presents has nice ideas for presenting the activity, but some of the plans have not been developed fully or may not be the best for the chosen course or lesson. Perhaps more specifics are needed.	Ideas for lesson are okay, but not adequately delineated. Your discussion of some of the items related to the lesson is either missing or too vague. You need to think more deeply about how the lesson might proceed in a secondary classroom and the questions students will have.	You may have selected an activity and course, but it is not clear how the activity would proceed. Wording of the lesson may be poor and hard to understand. You have not considered what might actually occur in a classroom.
Assessment	Writer has fully developed an assessment appropriate to lesson and objectives. Multiple approaches to reasoning have been considered. Assessment can be used for improvement of lesson, amending future lessons, or individual improvement of students.	Assessment plans are appropriate to lesson and objectives, but either the paper does not clearly convey how the assessment will be conducted and used or the assessment does not allow for some student approaches.	Plans for assessment are present, but are minimally developed. Some objectives or alternative approaches may have been overlooked. Assessment of reasoning skills may be minimal.	Plans for assessment are missing, too vague, or not directly connected to lesson and objectives. Alternative approaches have not been considered. Assessment of reasoning and proof skills may be missing.
Originality and Depth	Writer has gone beyond the basic assignment by one or more of the following: creation or revision of activities, creative and effective incorporation of reasoning into course, or more involved assessment. Discussion of activity, objectives, and assessment is thorough. Citations are used only where appropriate.	The paper addresses the requirements, but does not go substantially beyond them. Perhaps the lesson was revised, but discussion of assessment and connections to standards was simply adequate. Or the discussions, while thorough, may lack personal insight.	A few requirements have not been fully addressed or discussions are minimally adequate. Writer might frequently use citations without providing one's own insight. The writer failed to make explicit how the lesson helps students develop age appropriate reasoning and proof skills.	Discussion is weak. Writer has not met many requirements fully. Writer tends to rely on material copied from other sources as opposed to providing own insight and creativity. Lesson may be taken primarily from one source such as a book, journal article, curriculum guide, or a teacher's lesson plans.
Organization	Information in paper is presented in a clear and logical manner. All project criteria are easy to find while maintaining a nice flow in the paper. Paragraphs are coherent and appropriately used.	There may be a few minor errors in paragraph structure and arrangement of content, but overall the paper is well written. Perhaps some references are unclear or some of the writing is choppy.	Presentation needs more coherence. There may be some errors in paragraph structure. Your style of writing might not generate interest in the topic.	Project is messy and disorganized. Connections between sections are unclear. Discussions lack coherent paragraph structure.
Mechanics	Bullets and headings are consistent throughout. Spelling, grammar, and mathematical notation are correct.	Very few errors in spelling, grammar, bullets, or notation. Errors are minor and do not interfere with clarity of paper.	Some, but not many, minor errors and very few major errors in mechanics. One or two may affect clarity.	Repeated minor errors or several major errors in spelling, grammar, or notation interfere with reading of paper. Sloppy paper. Inconsistent style.