

**Course Syllabus for Math 1010: Essential Mathematics for the Informed Society
(Critical Thinking) Spring 2016
Section 001
8:00-9:15 AM Daniel 315**

Required Text: *Puzzles, Paradoxes, and Problem-Solving: Introduction to Mathematical Thinking* (M. Reba & D. Shier); CRC Press, Taylor & Francis LLC, 2015; ISBN: 978-1-4822-2753-6.

Calculator: A basic or scientific calculator is recommended.

Instructor Information:

Instructor: Dr. Marilyn Reba
Office: Martin Hall, O-202
Email: mreba@clemson.edu (email is the best way to contact me)
Office Hours: TTH 9-10 AM; W 2-3 PM, and by appointment.

Do not hesitate to make an appointment if these office hours do not work for you. It is important to get your questions answered early so you don't fall behind.

Course Description

MATH 1010 (Essential Mathematics) was created with three specific objectives: (1) To prepare the student for the mathematics encountered in the other college courses, particularly core courses in social and natural sciences; (2) To develop the ability to reason with quantitative information in a way that will help the student achieve success in a career; and (3) To provide the critical thinking and quantitative reasoning skills needed to understand major issues in life.

MATH 1010 – Special Section on Critical Thinking: This section is participating in the Clemson Thinks² (CT²) experiment in critical thinking. This means that this section embraces the three goals of the general course, but emphasizes (3). We will practice critical thinking while exploring mathematical representations, strategies, and algorithms from graph theory, logic, statistics and probability, and voting theory. In these contexts, we will introduce mathematical techniques and ways of thinking that will assist us in analyzing and solving a wide range of problems in society. Too often we confront complex problems at work or in other contexts where our intuitions about how to solve them are either misleading or too vague. Experience with these mathematical techniques will provide us with models for decomposing complex problems and for constructing systematic solution strategies. Critical thinking will be needed to effectively communicate and interpret these solutions in context.

Prerequisites: To enroll in MATH 1010 a student must score a minimum of 50 on the CMPT or have course credit for any EXST or MATH course with the following exception. This course is not open to students who have credit for MATH 3010, 3020, 3090 or EXST 3010. Students who do not meet prerequisites will not be permitted to remain in the course.

General Education: All Clemson students must demonstrate achievement of the Gen Ed Competencies listed on pp. 37-38 of the 2014-15 Undergraduate Announcements. MATH 1010 teaches the Mathematics competency:

Demonstrate mathematical literacy through solving problems, communicating concepts, reasoning mathematically, and applying mathematical or statistical methods using multiple representations where applicable.

Learning Outcomes: CT² outcomes are in bold below, with course-specific outcomes listed underneath. Upon successful completion of this course, a student will be able to:

1. Explore complex challenges.

- Explore complex problems from a variety of areas including biology, communication, transportation, business, politics, and the law.
- Identify goals, explain how to organize and expand the given data, and recognize appropriate strategies and solution algorithms.

2. Analyze multi-dimensional problems.

- Analyze various puzzles using directed and undirected graphs and determine the most efficient set of moves.
- Analyze the logical validity of arguments arising in the public sphere.
- Draw and analyze decision trees for a variety of problems.

3. Extrapolate from one conceptual context to others.

- Recognize that certain mathematical representations and strategies used to solve one type of problem may also be useful in others.
- Apply exact algorithms for finding Eulerian circuits and shortest paths.
- Apply heuristic algorithms for routing problems and coloring problems.
- Construct Boolean circuits that execute a given task.
- Compute the probability of occurrence of a particular event using theoretical methods and counting techniques.
- Calculate *a posteriori* probabilities using Bayes' Theorem.

4. Synthesize alternative solutions (some exact, some approximate) to multi-dimensional problems.

- Compare alternative solutions to a given problem and identify strengths and weaknesses.
- Recognize when a conclusion to an argument is and is not necessarily true.
- Evaluate the accuracy of statistical statements to identify inadequate or deceptive statistics.
- Analyze the outcome of an election using a variety of voting methods; explain the concept of weighted voting; explore the implications of a variety of apportionment methods.

5. Communicate complex ideas effectively.

- Interpret basic statistics and probabilities. (For example, find the probability of the occurrence of a particular event using theoretical methods and counting techniques; explain conditional probabilities.)
- Interpret statistical information or evidence and draw appropriate conclusions.
- Determine the consequences of errors in computing and interpreting statistics and probabilities.
- Construct a valid argument based on explicit or implicit assumptions and information.

Documenting the critical thinking learning process: Critical thinking is a process and your skills and attitudes develop over time. To document this process, we will administer the following:

- The California Critical Thinking Skills Test at the beginning and end of the course. Your grade on these tests will be part of your activity grade.
- Certain assignments that you complete for this course will be designated as **CT² artifacts**. Copies of these assignments will be kept as documentation of your critical thinking learning process.

Blackboard and Email: I will post the syllabus, handouts, keys and other important course materials on Blackboard: bb.clemson.edu. I may also email course information to your Clemson email address. It is your responsibility to check Blackboard and your Clemson email account regularly.

Attendance: You are expected to attend every class. If you miss a class, YOU are responsible for the notes and assignments you missed. Please arrive to class on time. University sanction absences require

documentation in advance. If I do not arrive in class within 15 minutes of our scheduled start time, class is dismissed for the day.

Cell Phone Policy: Please turn off or silence all phone during class. This means NO texting, messaging or websurfing during class. Also, you may not use your cell phone as your calculator.

Grading:

Homework and In-Class Activities	20%
3 Unit Exams:	60% (20% each)
Cumulative Final Exam:	<u>20%</u>
	100%

The final exam score may replace one of your unit exam scores, if beneficial. Your final grade will be determined using the standard grading scale.

A	90 – 100	B	80 – 89	C	70 – 79	D	60 – 69	F	Below 60
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Homework and In-Class Activities: If you do not submit your homework on the day it is collected in class, or if you miss a class in which an in-class activity is submitted (quiz, group work), ***THERE ARE NO MAKEUPS or LATE SUBMISSIONS.*** *Instead, 10% of homework and in-class activities will be dropped at the end of the semester to account for the occasional unavoidable absence (sickness, family issues, etc.).* Your final homework/class activity grade will be computed as total points earned out of total points possible.

Additional notes on homework: Points will be deducted if you do not write legibly in pencil and fail to staple multiple sheets together. (It helps to solve the problem on scratch paper first, then to rewrite it on new paper to hand in.)

Exams: There will be 3 unit exams and 1 comprehensive final exam. Each unit exam will test basic techniques used on the types of problems you’ve worked on in class. (Exams will not test the hardest concepts nor contain surprise problems.)

Exam Dates

- Exam 1: 2/3(7:30-9:00 PM)
- Exam 2: 3/2 (7:30-9:00 PM)
- Exam 3: 4/13 (7:30-9:00 PM)
- Final: 4/27 (7:00 – 9:30 PM)

Absence from an exam result in a grade of zero. In general, make-up tests are not given. However, a University-Sanctioned absence may qualify as an excused absence and a make-up test may be arranged in this case. A request to do this must be made 24 hours prior to the scheduled exam. For any exam, students have 1 week after the exam to request the correction of clerical errors or to request grading reconsideration.

The final exam is mandatory and comprehensive. No rescheduling will be allowed to accommodate travel arrangements.

Inclement Weather Policy: Any exam that was scheduled at the time of a class cancellation

Course Structure

The following teaching methods will be used to teach the course content and improve your critical thinking skills.

Readings: Prior to each class meeting, you will be assigned some reading from the text or elsewhere that will help prepare you to engage in analyzing and solving problems in the next class.

Lectures and modeling: Each class will be taught with mini-lectures. The instructor will present content, as well as model the problem-solving process through examples.

HW and Quizzes: HW due every T; Quizzes on TH.

Group learning activities: Some class time will be used to work in groups on solving problems or analyzing a case study. The instructor will serve as a coach during these learning activities.

Communicate, analyze, and compare solutions: We will ask groups to share their solution to a problem with the class. You will need to be clear in communicating your solution as well as your solution process. The class will be asked to analyze your work. Questions to consider may include: What assumptions were made in the solution? Are there any errors? Are there possible alternative solutions? Does the method of solution generalize to more complex problems? In the case of alternative solutions, we will compare alternative methods and discuss strengths and weaknesses of each approach.

Accommodations: Student with disabilities who need accommodations should make an appointment with the instructor to discuss special needs within the first month of classes. Students should present a Faculty Accommodation Letter from Student Disability Services at the meeting. Student Disability Services is located in the lower level of Redfern Health Center/G-20 (phone: 656-6848; Email: sds-1@clemson.edu). Please be aware that accommodation letters are NOT retroactive and new accommodation letters must be presented each semester. If you have a letter stating specific testing accommodations to which you are entitled, please turn in a copy to your instructor at least one week prior to the test.

Clemson University Title IX: Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran's status, genetic information or protected activity (e.g., opposition to prohibited discrimination or participation in any complaint process, etc.) in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. This policy is located at <http://www.clemson.edu/campus-life/campus-services/access/title-ix/>. Mr. Jerry Knighton is the Clemson University Title IX Coordinator. He also is the Director of Access and Equity. His office is located at 111 Holtzendorff Hall, 864.656.3181 (voice) or 864.565.0899 (TDD).

Academic Dishonesty

Students are expected to adhere to the following official Clemson academic integrity statement:

As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a "high seminary of learning." Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form.

www.registrar.clemson.edu/publicat/catalog/2012/2012.htm– Detailed information about Clemson University undergraduate class regulations including academic integrity, attendance policy, mid-term grades, final examinations, and posting of grades.

ePortfolio: Certain assignments (such as Problem Summaries) from this course may be acceptable artifacts for the Mathematics and Critical Thinking general education competencies. You should add and tag these artifacts at eportfolio.clemson.edu.