**Suffolk**
COUNTY COMMUNITY COLLEGE

**EASTERN CAMPUS MATH & SCIENCE DEPARTMENT**
**COURSE OUTLINE**
**Spring 2020**

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| **Course** | MAT 102 - A Survey of Contemporary Topics in Mathematics |
| **Course Number** | 34213 |
| **Prerequisite** | Elementary Algebra (MAT 006, MAT007, or equivalent) |
| **Lectures** | Tuesday, Thursday \| 2:00pm – 3:15pm \| S-206 |

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| **Professor** | Jean Nicolas Pestieau, Ph.D. |
| **Office** | Shinnecock 223 |
| **Contact** | pestiej@sunysuffolk.edu |
| | ☏ 548-3585 (Office) \| 548-2628 (Department) |
| **Website** | https://www.sunysuffolk.edu/explore-academics/faculty-and-staff/faculty-websites/jean-nicolas-pestieau/mat111.jsp |
| | ***\*\*\* This College website can be accessed directly on the internet and does not require access to Blackboard. \*\*\**** |

| **Office Hours** | Monday/Wednesday: | 12:30pm – 1:30pm & 3:30pm – 4:00pm |
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| | Tuesday/Thursday: | 11:00am – 11:30am & 1:30pm – 2:00pm |
| *Students may also request appointments at other times than those listed above.* | | |

## Course Description

Liberal arts mathematics course providing an appreciation of contemporary mathematics by examining nontraditional topics such as probability and statistics; theories of games, groups and numbers; and finite differences. Notes: (1) Credit given for MAT102 or MAT108, but not both. (2) Fulfills SUNY General Education Requirement for Mathematics. Prerequisite: MAT006, MAT007, MAT009 or equivalent.

## Course Goals

- Expose students to contemporary developments in mathematics.
- Discuss current applications of probability.
- Discuss non-traditional topics in geometry.

## Learning Outcomes

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

1. Demonstrate an understanding of the use of factorials, combinations and permutations;
2. Demonstrate an understanding of what is meant by probability and conditional probability;
3. Compute P(A), P(A, given B), P(A and B) and P(A or B);
4. Demonstrate a fundamental knowledge of axiomatic structures by comparing different geometric systems;
5. Demonstrate a fundamental knowledge of number theory (congruence classes, prime numbers, perfect numbers, divisibility and sequences).
6. Solve two-dimensional linear programming problems graphically;
7. Demonstrate a fundamental knowledge of statistics (frequency distributions and their graphs, averages and variability);
8. Demonstrate a fundamental knowledge of matrices, their operations and uses;
9. Demonstrate a fundamental knowledge of game theory, mathematical expectation and how to solve 2x2 games;
10. Demonstrate a fundamental knowledge of finite groups and their applications;
11. Find the general term of a mathematical sequence using finite differences or other methods;
12. Use mathematical induction to prove series formulas.


## Course Requirements

- **Attendance:** Students are required to attend every class and are responsible for all that transpires in class, whether or not they are in attendance.  Should a student have a valid reason to miss class, he/she should notify the professor at once.

  > _College-Wide Attendance Policy: The College defines excessive absence or lateness as more than the equivalent of one week of class meetings during the semester.  Excessive absence or lateness may lead to failure in, or removal from, the course._

- **Class Conduct:** Students are required to behave in accordance with the student code of conduct, as outlined in the student handbook.  An atmosphere of mutual respect will be maintained at all times in the classroom.  Any student who is disruptive or violates proper classroom decorum will be asked to leave the classroom at once.

- *Technology:* A calculator is not required for this course.  However, students will need access to a basic calculator at home to evaluate probabilities, investigate the divisibility of large numbers, and perform other mathematical computations.  If needed, students may borrow scientific (non-graphing) calculators in S-120, the Math & Science Learning Center, in exchange of their student ID.  Use of any other electronic device in class is strictly prohibited.  **Students must turn off (or silence) and stow away any cell phones, computers, tablets, etc. at the start of each class.  Failure to do so will result in immediate removal from the classroom.**

> *Departmental Cell Phone and Tablet Policy***:** *Cellular phones and tablets are considered a classroom distraction and are not permitted in class at any time.  All cell phones should be out of sight and either turned off or placed in silent mode so they do not ring during class.  Cell phones are not a substitute for calculators.  If a calculator is required, students must be prepared with a standard, scientific or graphing calculator as permitted in that class.  Students in violation of this policy will be asked to leave the class for that day and an absence will be indicated for that class.  It is the student's responsibility to request, in advance, an exception to this policy from their professor.  Exceptions will be considered on a case-by-case basis.*

- *Withdrawal:* Students who wish to withdraw from the course must do so before **Wednesday, March 25**, the mid-semester day.  Students who stop coming to class without officially withdrawing will receive an F for the course.


## Course Procedures

- *Take-Home Exams*: 4 take-home exams and 1 extra-credit assignment will be given covering the 5 core topics of the course.  Students may work together on these exams, but all submissions must be individually prepared.  **All exams must be submitted at the start of the lecture on their due date, without exception.** No make-up exams will be given.  It is the student's responsibility to notify me of any reason that should prevent them from submitting an exam by the due date. Solutions to all questions in the exams will be posted on the website and/or distributed in class. Students are encouraged to review these solutions as they become available.

- *Final Exam:* No final exam will be given for this course.

- *Extra-Credit Assignment:* An extra-credit assignment will be posted on the website. Students may submit work on this assignment for extra-credit.  Any extra points given to students will be commensurate with the extent of work shown.

- *Homework:* Exercises from the course materials and the open textbook will be posted on the website. While this homework will not be collected or graded, all students are expected to try doing these problems at home to supplement their understanding of the material covered in lectures. Furthermore, students are encouraged to ask questions about the homework at the beginning of class or during office hours.

- *Grading*: An overall assessment of the student will be made based on his/her performance on the take-home exams. All exams will include a numerical grade out of 100 and a letter grade based on a reasonable class grade distribution. The typical correspondence between numerical and letter grades is given in the table below.

| Numerical Grade | Letter Grade |
|:---:|:---:|
| < 40 | F |
| 40 – 50 | D |
| 50 – 55 | D+ |
| 55 – 65 | C |
| 65 – 70 | C+ |
| 70 – 80 | B |
| 80 – 85 | B+ |
| >85 | A |

The final grade will be based on the following formula:

| Take-Home Exam 1 | 25% |
|:---|:---|
| Take-Home Exam 2 | 20% |
| Take-Home Exam 3 | 30% |
| Take-Home Exam 4 | 25% |

## Open Textbook

*Math in Society, Version 2.5*
Author: David Lippman

## Supporting Information

The Math & Science Learning Center (MSLC) located in S-120 is open to all students for tutoring.  Check the MSLC schedule posted outside for more information.


## Attendance on Religious Observance

As provided for in New York State Education Law §224-a, student absences from class necessitated by religious observance will be deemed an excused absence, with no academic consequences. Students must notify their professor in advance of their religious observance, via their College email accounts or otherwise in writing, of their intention to be absent from a particular class due to a religious observance; notification should occur at least one week prior to the religious observance. Observing students shall be granted reasonable arrangements and/or be permitted a reasonable amount of time to make up missed quizzes, tests, assignments, and activities covered in their absence. Please refer to the College's Religious Observance Policy, which is available on the Office of Legal Affairs' website, for additional information.


## Services for Students with Disabilities

Suffolk County Community College provides reasonable accommodations to registered students with disabilities who have self-identified and been approved by the Office of Disability Services. Once approved for reasonable accommodations, such students will be provided with a laminated letter, describing the specific accommodations. Students must present this laminated letter to each of their professors before accommodations can be provided.

Students who have, or think they may have, a disability are invited to contact Disability Services for a confidential consultation.

**Disability Services Contact Information:**

o   **Ammerman Campus**
Call the Disability Services Office at 631-451-4045, email the Office at disabilityserv-ammr@sunysuffolk.edu or stop by to make an appointment at Room 202 in the Ammerman Building.

- **Eastern Campus**

Call the Disability Services Office at 631-548-2527, email the Office at [disabilityserv-east@sunysuffolk.edu](mailto:disabilityserv-east@sunysuffolk.edu) or stop by to make an appointment at the Student Success Center in the Peconic Building, Room 122.

- **Michael J. Grant Campus**

Call the Disability Services Office at 631-851-6355, email the office at [disabilityserv-west@sunysuffolk.edu](mailto:disabilityserv-west@sunysuffolk.edu) or stop by to make an appointment in Caumsett Hall, Lower Level 20.

## Academic Integrity

Suffolk County Community College provides students with the opportunity to demonstrate their knowledge by submitting coursework that is uniquely theirs and giving proper attribution to the work of others. Participating honestly in the SCCC academic community ensures that students can take pride in their education and their contributions to scholarship. Without academic integrity, students gain unfair advantage over others and prevent their own intellectual progress. As a student in this class, you are expected to uphold the SCCC core value of Integrity and understand the Special Procedures for Academic Dishonesty in the relevant sections of the [SCCC Student Code of Conduct](#).

The Code prohibits academic misconduct, which includes any action that results in students giving or receiving unauthorized assistance in an academic exercise, or receiving credit for work that is not their own. Academic exercise includes all forms of work submitted for credit. Academic misconduct includes, but is not limited to, the following behaviors: **cheating** on exams; **plagiarizing -** using another person's work or ideas without crediting them; **complicity -** helping a student, or being helped, to engage in academic misconduct; **multiple submissions** - submitting the same work for credit in more than one course without the instructor's permission; **falsification and forgery** - inventing information or falsifying the identity of a student.

Information about the Student Code of Conduct, plagiarism and the citation process is in the [Academic Integrity and Plagiarism Guide](#).

## Outline of Topics

- *All materials for the topics covered in the course will be posted directly on the website or via links.*
- *The due dates given below are subject to change due to unexpected circumstances (such as class cancellation).*

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### 1. THE MATHEMATICAL METHOD
- How is mathematics practiced nowadays?
- Inductive vs. Deductive Reasoning
- Conjecture vs. Proof

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### 2. NUMBER THEORY
- Prime Numbers
- Divisibility and the Fundamental Theorem of Arithmetic
- The Distribution of the Primes
- Selected Topics in Number Theory:
  *Perfect Numbers and Mersenne Primes, Fermat's Last Theorem,*
  *Goldbach's Conjecture, Abundant and Deficient Numbers*

*Take-Home Exam 1 [Due 2/25]*

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### 3. MATHEMATICAL SYSTEMS
- Modular Arithmetic
- Applications of Modular Arithmetic:
  *ISBNs, Zeller's Congruence, Cryptography*
- Introduction to Group Theory

*Take-Home Exam 2 [Due 3/12]*

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### 4. COMBINATORICS & PROBABILITY
- The Counting Principle
- Permutations and Combinations
- Probabilities and Odds
- Basic Rules of Probability Theory
- Conditional Probability

*Take-Home Exam 3 [Due 4/21]*

### 5. MODERN CONCEPTS IN GEOMETRY

- The Parallel Postulate in Euclidean Geometry
- Non-Euclidean Geometries
- Fractals

*Extra-Credit Assignment [Due 4/28]*

### 6. GRAPH THEORY

- Basic Concepts, Definitions and Algorithms
- Euler Paths and Euler Circuits:
  *The Königsberg Bridge Problem, Pen-Tracing Puzzles*
- Hamiltonian Paths and Hamiltonian Circuits:
  *The Traveling Salesman Problem, Weighted Graphs*
- Planarity:
  *Euler's Polyhedral Formula, Platonic Solids, Kuratowski's Planarity Theorem*

*Take-Home Exam 4 [Due 5/19]*

### Important Dates

- Tuesday, March 3 – No class (SCCC Professional Development Day)
- Wednesday, March 25 – Mid-semester deadline for withdrawal
- Tuesday, March 17 & Thursday, March 19 – No class (Spring recess)
- Thursday, May 21 – SCCC 2020 Commencement Ceremony