Program Cover sheet -MAT 106: Mathematical Structures and Algorithms for Educators II

I.Basic Course Information
Purpose statement: In 2001, the Conference Board of Mathematical Sciences, in conjunction with the American Mathematical Society and the Mathematical Association of America, the nation's two primary national mathematical organizations, published a report entitled, *The Mathematical Education of Teachers.* Among its recommendations are:

- Prospective teachers need mathematics courses that develop a deep understanding of the mathematics they will teach.
- Prospective elementary grade teachers should be required to take at least 9 semester-hours on fundamental ideas of elementary school mathematics.

MAT 106 is part of an experience that is aimed at meeting these recommendations. MAT 105 and MAT 106 will study the fundamental principles that underlie elementary school mathematics from an advanced viewpoint.
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II. Learning Goals
In MAT 106, students will engage in a thorough development of geometry, measurement, data analysis, statistics, and probability. Through this process, they will develop understanding of the processes and algorithms found in elementary mathematics and discover purposes beneath the symbols and techniques. In addition, upon completion of this course, we expect students to show an improved ability to communicate mathematical ideas appropriately using the language of mathematics, to reason mathematically, to solve various types of problems using appropriate strategies, and to relate mathematics to other subjects, its applications in society, and to other mathematical topics.

The profound understanding of fundamental mathematics that students gain in MAT 105 and MAT 106 will prepare them for the methods course that they take in their sophomore year, where they learn methods and strategies for teaching elementary mathematics to various types of learners.

III. Student Assessment
Students will receive regular feedback on their work through the assignment of homework, written and oral communication, group and/or individual projects and/or explorations, and examinations. Through this feedback, students will be able to see and correct their misunderstandings and improve their performance. Student performance on these assessment instruments and the performance of students in their future mathematics methods courses and field placements will be used to assess the success of MAT 106 in achieving its learning goals and its contribution to the fulfillment of the Elementary and Early Childhood and Special Education program goals.

IV. Learning Activities
In the mathematics methods course that students take in the sophomore year, they will learn a variety of teaching strategies appropriate for teaching elementary mathematics. They will learn about state and national standards for K-6 mathematics, and how to implement these standards in the classroom.

Students must experience standards-based teaching and learning in order to understand how to implement it. Learning activities will consist of a combination of lectures, explorations, group work, participation in class discussions, readings, written homework assignments, and group or individual projects. It is important that a variety of strategies and methods of instruction should be used to model effective teaching of mathematics.

Sample syllabus **(Specific details can vary, but all of the sections below must be included.)**

MAT 106 Mathematical Algorithms and Structures for Educators II
Spring 2020 Room P218

Instructor: Eric Wasserman   **Office Hours**: P218 or P217 M-W 30-45min before class
Office: Science complex P217   Other hours by appointment
Phone: 908-391-6680
E-mail: wasserma@tcnj.edu

Course Materials:
Textbook: *Mathematics for Elementary School Teachers*, **5th, 6th, or 7th** edition, by Tom Bassarear.
We will cover Chapters 7-10 in this course.

Description of Course:
This course concerns the development of geometry, measurement, data analysis, statistics, and probability. You will be required to reason mathematically, solve problems, and communicate mathematics effectively at different levels of formality, using a variety of representations of mathematical concepts and procedures. Physical materials and models will be used to explore fundamental concepts of geometry, measurement, data analysis, statistics, and probability. This course is especially appropriate for those students preparing to be elementary, early childhood, or special education teachers. This course will study the fundamental principles that underlie elementary school mathematics from an advanced viewpoint, building on knowledge that students bring with them from their K-12 education**.** This course is especially appropriate for EECE and SELL majors.

Course prerequisites: This course will study the fundamental principles that underlie elementary school mathematics from an advanced viewpoint, building on knowledge that students bring with them from their K-12 education. Students must be in the EECE or SELL department to enroll.

Learning Goals
Content goals: We will engage in a thorough development of geometry, measurement, data analysis, statistics, and probability. Through this process, you will develop understanding of the processes and algorithms found in elementary mathematics and discover purposes beneath the symbols and techniques. You may enter the course having had very little experience with probability. **This is now a subject that is part of the standards for K-12 at the state and national levels. You need to have a strong understanding of this subject and its relationship to statistics before you can teach it.** Many students also have misconceptions about geometry and a lack of spatial reasoning ability. Through careful consideration of geometrical concepts and activities to develop spatial reasoning, you will feel more comfortable and knowledgeable with this subject.

Performance goals: By the completion of the course, the successful student will be able to demonstrate all of the following:
- Understanding of the processes and algorithms, and the purposes beneath them, found in the elementary mathematics topics mentioned above.
- An improved ability to communicate mathematical ideas appropriately using the language of mathematics.
- An improved ability to reason mathematically.
- A willingness and ability to solve various types of mathematical problems using appropriate strategies.
- Knowledge of the relationship of mathematics to other subjects, its applications in society, and relationships within mathematics itself.
- An appreciation of the history, structure, and application of mathematics.

A scientific calculator will help during chapter 7. There are a limited amount available to borrow in the classroom.

Students are invited to participate in class by taking notes, assisting their peers and their instructor during class, explaining their reasoning and problem solving methods to the class, and making brief presentations based on their explorations. Everyone is invited to ask questions and offer ideas for discussion.

Please refrain from doing anything other than MAT 106 while in class. Your agenda during this time-frame should include this class and nothing else. **College students should not have to be told to put phones away or to stop e-mailing or googling on their laptops or tablets.**

STATEMENT OF INDEPENDENT STUDY for FOURTH CREDIT

In this class, the deep learning outcomes associated with TCNJ's 4th hour are accomplished by a series of rigorous educational assignments that extend beyond the typical scheduled class time. These include additional out-of-class learning activities provided by the instructor in the form of problem sets or explorations and by you in the form of independent research. This weekly research will include finding examples from the "real-world" which demonstrate characteristics of the current topic(s) of the class or developing your own activity related to these timely topics.

Course Requirements:

chapter tests and/or problem sets	45%
class participation	5%
group work	5%
homework	20%
final exam	25%

Tests (opportunities) and/or problems sets:
See course outline for dates. Make-ups for tests will be given only in the case of an excused absence and only if I am notified within 24 hours of the missed exam. The final exam will be given during final exam week at the scheduled time and will be **comprehensive**.

Homework:
Homework will be assigned frequently. It will not always be collected and graded. Homework may be discussed at the beginning of class. I will tell you when an assignment is to be turned in for a grade. If you must miss class when an assignment is due, you must contact me to make other arrangements. You are still expected to turn in the assignment. . Homework will only be accepted late in the case of an excused absence.

Students are expected to attempt each problem assigned. **Students should review textbook notes and examples to see alternative approaches to problems.** Students should do work neatly and provide justifications for their output. Homework should not be done in the textbook, but it should be done on paper so it can be collected (if the instructor so desires) or examined by the instructor.

Doing homework and problem sets neatly and carefully will not only make you a better math student, but allow you a better understanding of the material so you can articulate mathematics in the future. After all, your goal is to teach this material to students in the future.

There will also be short activities assigned that will require a few minutes of on-line searching. They are FUN, and they should be completed.

Learning activities:
Learning activities will consist of a combination of lectures, explorations, group work, participation in class discussions, readings, written homework assignments and reflections, and group projects.

Group work:
Part of this course will be spent working in small groups. We will form these groups near the beginning of the semester with the option at some point during the semester to switch them around. Naturally, if anyone has a major problem working in a particular group, you may tell me and we will switch the groups. In addition to working together in class, you are encouraged to work together outside of class on homework. However, the final expression, the answer to a question, the solution and explanation to a problem, are matters for individual action to show that each person comprehends the matter at hand in their own way. Work that is merely copied will not be tolerated.

<u>Tentative</u> Course Outline (I may change the order of lessons and insert/delete Opportunity)

<u>Week</u>	<u>Topic</u>	<u>Reading</u>
1	Representing and Interpreting Data	Section 7.1
2	Distributions: Center and Spreads	Section 7.2
3	Concepts Related to Chance	Section 7.3
4	Counting and Chance	Section 7.4
	Test (Opportunity) 1	
5	Basic Concepts of Geometry	Section 8.1
6	Classifying Two-Dimensional Figures	Section 8.2
7	Classifying Three-Dimensional Figures	Section 8.3
8	Similarity and Ratio and Proportion	Sections 5.1 & 9.3
	Test (Opportunity) 2	
9	Congruence Transformations	Section 9.1
10	Symmetry and Tessellations	Section 9.2
11	Systems of Measurement	Section 10.1
12	Perimeter and Area	Sections 10.2
13	Surface Area and Volume	Section 10.3
	Test 3 (Opportunity)? or Problem Set due	
14	Review	
15	Final Exam	

An Opportunity is considered an opportunity for you to show me what you have learned.

CANVAS is a web-based course management system. Through CANVAS, you can email classmates, submit assignments through a virtual drop box, and find class resources such as this grading policy and tentative course outline, and assignments (you may need to click on the + symbol next to the heading). To get to CANVAS, use any web browser and point it to the following location:
http://canvas.tcnj.edu
On the login page, you can find instructions for using the system under "Student Documentation". Use your e-mail login name and password to get in. Once in CANVAS there will be a menu for this course. The departmental syllabus for this course is available on CANVAS or in your EMAIL.

SELECTED TCNJ POLICIES

TCNJ's final examination policy is available on the web:
http://www.tcnj.edu/~academic/policy/finalevaluations.htm

Attendance
Every student is expected to participate in each of his/her courses through regular attendance at lecture and laboratory sessions. It is further expected that every student will be present, on time, and prepared to participate when scheduled class sessions begin. At the first class meeting of a semester, instructors are expected to distribute in writing the attendance policies which apply to their courses. While attendance itself is not used as a criterion for academic evaluations, grading is frequently based on participation in class discussion, laboratory work, performance, studio practice, field experience, or other activities which may take place during class sessions. If these areas for evaluation make class attendance essential, the student may be penalized for failure to perform satisfactorily in the required activities. Students who must miss classes due to participation in a field trip, athletic event, or other official college function should arrange with their instructors for such class absences well in advance. The Office of Academic Affairs will verify, upon request, the dates of and participation in such college functions. In every instance, however, the student has the responsibility to initiate arrangements for make-up work.

Students are expected to attend class and complete assignments as scheduled, to avoid outside conflicts (if possible), and to enroll only in those classes that they can expect to attend on a regular basis. Absences from class are handled between students and instructors. The instructor may require documentation to substantiate the reason for the absence. The instructor should provide make-up opportunities for student absences caused by illness, injury, death in the family, observance of religious holidays, and similarly compelling personal reasons including physical disabilities. For lengthy absences, make-up opportunities might not be feasible and are at the discretion of the instructor. The Office of Academic Affairs will notify the faculty of the dates of religious holidays on which large numbers of students are likely to be absent and are, therefore, unsuitable for the scheduling of examinations. Students have the responsibility of notifying the instructors in advance of expected absences. In cases of absence for a week or more, students are to notify their instructors immediately. If they are unable to do so they may contact the Office of Records and Registration. The Office of Records and Registration will notify the instructor of the student's absence. The notification is not an excuse but simply a service provided by the Office of Records and Registration. Notifications cannot be acted upon if received after an absence. In every instance the student has the responsibility to initiate arrangements for make-up work.

TCNJ's attendance policy is available on the web:
http://www.tcnj.edu/~recreg/policies/attendance.html

Academic Integrity Policy
Academic dishonesty is any attempt by the student to gain academic advantage through dishonest means, to submit, as his or her own, work which has not been done by him/her or to give improper aid to another student in the completion of an assignment. Such dishonesty would include, but is not limited to:

submitting as his/her own a project, paper, report, test, or speech copied from, partially copied, or paraphrased from the work of another (whether the source is printed, under copyright, or in manuscript form). Credit must be given for words quoted or paraphrased. The rules apply to any academic dishonesty, whether the work is graded or ungraded, group or individual, written or oral.

TCNJ's academic integrity policy is available on the web: http://www.tcnj.edu/~academic/policy/integrity.html.

Americans with Disabilities Act (ADA) Policy
Any student who has a documented disability and is in need of academic accommodations should notify the professor of this course and contact the Office of Differing Abilities Services (609-771-2571). Accommodations are individualized and in accordance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1992.

TCNJ's Americans with Disabilities Act (ADA) policy is available on the web: http://www.tcnj.edu/~affirm/ada.html

Campus resources for students:

There are a number of resources on campus that are available should you need them:

- Tutoring center - http://www.tcnj.edu/~tutoring/ , located in Roscoe West Suite 101, X3325. The tutoring center provides both individual and group tutoring in most mathematics and statistics courses. Also, please not that the Department of Mathematics and Statistics has student workers who provide some tutoring services in the departmental office. Times vary each semester but are posted in the department.

- Center for Academic Success - http://css.pages.tcnj.edu/ , located in Roscoe West Suite 131, x3452. CAS is not focused on tutoring individual courses, in general, but helps students to succeed in their academic career at TCNJ.

- Counseling and Psychological Services - http://www.tcnj.edu/~sa/counseling/ , Located in Eickoff Hall, Room 107, x2247. The Counseling and Psychological Services provide help to students with personal challenges. If you are concerned about the psychological health of a student, please contact them to discuss the matter.

- Health Services, http://health.pages.tcnj.edu/ , Eickoff Room 107, x2483.

- Alcohol & Drug Education Program - http://adep.pages.tcnj.edu/ , Forcina 308, x2572.