CUNY Common Core
Course Submission Form

Instructions: All courses submitted for the Common Core must be liberal arts courses. Courses may be submitted for only one area of the Common Core. All courses must be 3 credits/3 contact hours unless the college is seeking a waiver for another type of Math or Science course that meets major requirements. Colleges may submit courses to the Course Review Committee at any time. Courses must also receive local campus governance approval for inclusion in the Common Core.

College	Lehman College
Course Prefix and Number (e.g., ANTH 101, if number not assigned, enter XXX)	MAT 125
Course Title	Explorations in Geometry, Probability, and Statistics for Educators
Department(s)	Mathematics
Discipline	Mathematics
Credits	3
Contact Hours	3
Pre-requisites (if none, enter N/A)	Departmental permission
Co-requisites (if none, enter N/A)	n/a
Catalogue Description	Foundational content in geometry, probability, and statistics using accessible and relevant technology. Measurement, length, area, volume, transformations, experimental design, descriptive measures, sample space, and success. Note. Intended for pre-service elementary and middle school teachers.
Special Features (e.g., linked courses)	
Sample Syllabus	Syllabus must be included with submission, 5 pages max recommended

Indicate the status of this course being nominated:

☐ current course ☐ revision of current course ☒ a new course being proposed

CUNY COMMON CORE Location

Please check below the area of the Common Core for which the course is being submitted. (Select only one.)

Required	Flexible	
☐ English Composition	☐ World Cultures and Global Issues	☐ Individual and Society
☒ Mathematical and Quantitative Reasoning	☐ US Experience in its Diversity	☐ Scientific World
☐ Life and Physical Sciences	☐ Creative Expression	

Waivers for Math and Science Courses with more than 3 credits and 3 contact hours

Waivers for courses with more than 3 credits and 3 contact hours will only be accepted in the required areas of "Mathematical and Quantitative Reasoning" and "Life and Physical Sciences." Three credit/3-contact hour courses must also be available in these areas.

If you would like to request a waiver please check here:	☐ Waiver requested
If waiver requested: Please provide a brief explanation for why the course will not be 3 credits and 3 contact hours.	
If waiver requested: Please indicate whether this course will satisfy a major requirement, and if so, which major requirement(s) the course will fulfill.	

Learning Outcomes

In the left column explain the course assignments and activities that will address the learning outcomes in the right column.

B. Mathematical and Quantitative Reasoning: Three credits

A course in this area must meet all the learning outcomes in the right column. A student will:

SLO 1 will be assessed in multiple ways: in-class discussions, assignments, quizzes, and exams. Students will demonstrate competency in this SLO by interpreting quantitative representations—including formulas, diagrams, tables, and graphs—and draw appropriate inferences in contexts involving geometry, probability, and data analysis. **Examples of Assessment Tasks** **a) In class discussions and written assignments:** The following representative tasks require students to examine, engage with and interpret multiple representations, and make connections among them. • Examine the diagram showing points A, B, C, and D on a plane. Identify which lines are parallel, which are perpendicular, and justify your reasoning. (***Topic 1: Core Concepts- Points, Lines, Parallel, perpendicular***) • Examine a circle diagram with radius r and central angle θ. Identify circumference, area, and arc length relationships. (***Topic 2: Basic Geometric figures and Measurement***) • Given a diagram showing a series of transformation of a shape, describe the transformations that map the pre-image to the final image. (***Topic 3: Transformations – rigid-translation, reflection, rotation***) **b) Sample final exam** **SLO 1** will be primarily assessed in the final exam through the following topics and questions: **Primary** • **Question 1** (***Topic 1: Core Concepts (Points, Lines, Planes***) Students interpret a geometric diagram of intersecting lines and angles and determine which statement must be true. The task requires inferring geometric relationships from a visual representation followed by performing computation. • **Question 2** (***Topic 1: Core Concepts: Parallel & Perpendicular Lines; Angles formed by Transversals***) Students analyze a diagram involving transversals intersecting multiple lines and infer angle relationships. Success depends on interpreting geometric structure and relationships shown in the diagram. • **Question 8a** (***Topic 6: Measures of Center***) Students interpret frequency table data to identify the mean of the date. This requires understanding how numerical summaries emerge from a data representation and what frequency meant with respect to the raw data.	SLO 1: Interpret and draw appropriate inferences from quantitative representations, such as formulas, graphs, or tables.

Secondary **SLO 1** will be assessed in part by the following sample final exam questions: • **Question 6** (***Topic 3 & Topic 5: Transformations – Rigid Motions & Coordinate Geometry***) Students examine the graphs of two triangles, interpret how one graph transformed to become the second graph and draw out the type of transformation that maps the first image to the second image. • **Questions 9a and 9b** (***Topic 9: Conditional Probability; Independence of Event***s) Students interpret a two-way table to identify the correct sample space and determine a probability, requiring inference from tabular data. Also, they interpret a restricted sample space ("given that the person is allergic to nuts") using the two-way table, drawing inferences from a conditional representation.	
SLO 2 will be assessed on written assignments, quizzes, and exams. The following objectives, each aligned with this SLO, will be used to assess student's ability to meet this SLO: Translate geometric statements expressed in natural language into appropriate conditional and biconditional mathematical statements; Represent natural language geometric statements using the symbols, definitions, and logical structure of a formal axiomatic system; Represent probability and statistical word problems expressed in natural language using appropriate formulas, tables, or symbolic models. **Examples of Assessment Tasks** **a) In-class discussion and written assignments** The following examples give concrete questions students will be asked to solve related to this SLO: • Translate the following geometric statement into an appropriate conditional or biconditional logical statement using mathematical language and symbols: "Each angle of an equilateral triangle measures 60 degrees." (***Topic 2: Basic Geometric figures and Measurement – sum of angles of a triangle)*** • Prove the following statement using only the axioms of incidence geometry: if l is any point, then there exists a point P such that P does not lie on l. (***Topic 2: Basic Geometric figures and Measurement – Euclidean Geometry)*** • An amazon driver has 15 stops to make for the day. How many different routes can he choose from? If he can only make 7 of these 15 stops, then how many different routes does he have to choose from? ***Topic 9: Probability- Multiplication Principle of Counting)*** b) **Sample final Exam**: **Primary** In the sample final exam, SLO 2 will be assessed primarily by: • **Question 3**(***Topic 2 & Topic 5: Basic Geometric Figures & Measurement & Coordinate Geometry***) Students translate a verbal description of a circle's diameter into a coordinate-geometry representation using midpoint reasoning. • **Question 5a** (***Topic 2: Basic Geometric Figures & Measurement -Surface Area & Volume***) Translate the real-world description of into a mathematical model such as	SLO 2: Represent quantitative problems expressed in natural language in a suitable mathematical format.

"the minimum number of bags of concrete mix needed to make all 10 footings" into a volume formula plugging the given dimensions, and "how many gallons of paint needs to be purchased to paint all 10 footings" as a surface area formula, plugging the given conditions. • **Question 8a**. ***Topic 6: Measures of Center (Mean, Median, Mode) & Variation (Standard Deviation)*** Students translate a contextual description of student scores into numerical computations using frequency data. **Secondary** SLO 2 will also be addressed in part by the following sample final exam questions: • **Question 2**(***Topic 1: Core Concepts: Parallel & Perpendicular Lines; Angles formed by Transversals***) Students write an algebraic representation of angle relationship from a geometric representation based on a diagram.	
SLO 3 will be assessed on graded take-home assignments and on in-class graded quizzes and exams. Students will demonstrate mastery in this SLO by sing algebraic methods, including equation-solving techniques, to analyze and solve geometric problems and draw accurate conclusions; using appropriate descriptive statistical methods to analyze data sets and draw accurate conclusions about their characteristics; and using probability formulas to draw conclusions about the likelihood of success. **Examples of Assessment Tasks** **a) In-class discussion and written assignments** Below is a collection of example problems that students will be expected to solve aligned with the above objectives: • Your students have an open-top box that has a 2-in.-by-2-in. rectangular base and is 3 in. high. They also have a bunch of cubic inch boxes and some rulers. i) What is the most intuitive way for your students to determine the volume of the box? ii) What is a more advanced way for your students to determine the volume of the box? Why do these methods work? (***Topic 2: Basic Geometric Figures & Measurement - Surface Area & Volume***) • Julia's average on her first 3 math tests was 80. Her average on the next 2 math tests was 95. What is Julia's average on all 5 math tests? (***Topic 7: Measures of Center- Mean)*** • A family math night at school features the following game. There are two opaque bags, each containing red blocks and yellow blocks. Bag 1 contains 2 red blocks and 5 yellow blocks. Bag 2 contains 4 red blocks and 9 yellow blocks. To play the game, you pick a bag and then you pick a block out of the bag without looking. You win a prize if you pick a red block. Tom says that he is more likely to pick a red block out of Bag 2 than out of Bag 1 because Bag 2 contains more red blocks than Bag 1. Is this correct? Explain your reasoning. (***Topic 9: Probability- Theoretical and Empirical Probability)***	**SLO 3:** Use algebraic, numerical, graphical, or statistical methods to draw accurate conclusions and solve mathematical problems.

b) Sample final exam **Primary** **The following sample final exam questions will primarily assess SLO 3:** • **Question 4**: ***Topic 2: Basic Geometric Figures & Measurement -Circles (Tangent–Secant***) Students apply a geometric theorem and numerical computation to determine a segment length, given the segment's endpoints or an endpoint and a midpoint. • **Question 7**: (***Topic 4: Congruence & Similarity***) Students use proportional reasoning and similarity relationships to compute a missing length or segment of a triangle. **Secondary** **The following sample exam questions will also assess SLO 3 in part as follows:** • **Question 3**: (***Topic 2 & Topic 5: Basic Geometric Figures & Measurement & Coordinate Geometry***) Students apply algebraic and numerical methods to find missing coordinates using midpoint formulas. • **Questions 8a & 8b**. (***Topic 7: Measures of Center & Variations - Mean, Median, Mode & Standard Deviation; Distribution)*** Students compute the mean, median, mode and standard deviation using numerical and statistical methods. • **Question 9a & 9b** (***Topic 9: Probability (Two-Way Tables; Conditional Probability***) Students compute basic probability and conditional probability using ratios derived from the table.	
SLO 4 will be assessed using in-class presentations and discussions. Questions targeting this SLO will also be included on assignments, quizzes, and exams. Students will demonstrate competency in this SLO by explaining, describing, and effectively communicating the fundamentals of geometry, probability, and statistics to audiences of varied mathematical maturity: K-8 learners, 9-12 students, and college-level peers; and, familiarizing themselves with, interpreting, and explaining common mathematics errors made by elementary and middle school students with geometry, probability, and statistics. **Examples of Assessment Tasks** **a) In-class discussion and written assignments** • Write a clear explanation of how the triangle midsegment theorem works and why the midsegment is parallel to the base.(***Topic 1: Core Concepts- midsegment theorem; Topic 2: Basic Geometric Figures & Measurement – Midsegment of a triangle***) • Given a set of data, explain when it is most appropriate to use each measure of center. (***Topic 6- Measures of Center***-Mean, Median, Mode) **b) Sample final exam** **Primary** The following sample final exam questions will primarily assess SLO 4 as follows:	**SLO 4**: Effectively communicate quantitative analysis or solutions to mathematical problems in written or oral form.

• **Question 10**(***Topic 7: Measures of Variation – Normal Distribution / Normal Approximation to the Binomial***) Students must clearly communicate and justify quantitative reasoning by comparing an exact binomial probability with a normal approximation, explaining assumptions, limitations, and the appropriateness of each method using precise mathematical language. **Secondary** **The following sample final exam questions will also assess SLO 4 in part as follows:** • **Question 7 (*Topic 4: Congruence & Similarity*)** Students justify proportional reasoning using appropriate mathematical language. • **Question 4** (***Topic 2: Basic Geometric Figures & Measurement -Circles (Tangent–Secan***t)) Students must explain in writing how the tangent–secant theorem applies and justify their computations. • ***Question 5a & 5b (Topic 2: Basic Geometric Figures & Measurement -Surface Area & Volume***) Students explain modeling decisions, unit conversions, and final results in the given real-world context. **Note**: Since the main direction of the sample final exam requires students to show all their work and explain their reasoning to earn partial credits, then all the sample exam questions address SLO 4 in part.	
SLO 5 will be addressed during in-class discussions and written assignments and exams by explaining and describing why/how probability/statistical models describe a given situation, recognizing when they do not, and determining an appropriate alternative when feasible; determining if various geometric models/constructions are feasible given a set of constraints; and using estimation, bounds, assumptions, or limiting cases to evaluate results **Examples of Assessment Tasks** **a) In-class discussion and written assignments** The following sample questions illustrate what types of problems students will address in relation to these objectives: • Informally, describe what a circle is and what a sphere is giving real-world examples of both and noting the important similarities and differences between the two. Then, provide formal definitions of a circle and a sphere. (***Topic 2: Basic Geometric Figures & Measurement -Circles & Spheres***) • George and Thomas are flipping a penny. Thomas tells George that flipping three heads is way harder than flipping heads, followed by tails, followed by heads. Is Thomas right? Explain your reasoning. (***Topic 9: Probability - Multiplication Principle***) • It's time for Penny Wars at Raritan Valley School. Grades 1-4 compete to see which grade can raise the most money by collecting and submitting pennies. The fundraiser	SLO 5: Evaluate solutions to problems for reasonableness using a variety of means, including informed estimation.

lasts the full week, Monday through Friday, and each day the pennies received are counted. The grades want to create a display to be posted online that will show the daily progress. What do you recommend? Be specific, make sure your recommendations can be carried out realistically, and explain what you think the display should look like. (***Topic 8: Representing and Categorizing Data***) **b) Sample final exam** **Primary** The following sample final exam questions will predominantly address SLO 5 as follows: • **Question 8b** (***Topic 7: Statistics- Variability & Distribution***) Students evaluate the spread of data by determining which values fall within one standard deviation. **Secondary** • Question 9c (***Topic 9: Probability - Independence of Events***) Students assess whether two events are independent by comparing probabilities and judging consistency using their knowledge of conditional probability.	
SLO 6: will be assessed using groupwork sessions, assignments, quizzes, and exams. In these tasks, students will be expected to apply techniques in geometry, probability, and statistics to solve real-world problems including ones involving spatial reasoning, counting, and drawing conclusions from data. **Examples of Assessment Tasks** **a) In-class discussion and written assignments** An example of a problem that students would be asked to solve working together in a small group is as follows: • Who has longer last names Major League Baseball Players or National Football League Players? Design a plan using online resources and tools we have learned in statistics to address this question. Then, put this plan into action as best you can to come up with a preliminary hypothesis for this question. ***Topic 7: Statistics- Measures of Center & Variability; Distribution)*** **b) Sample final exam** **Engineering / Construction Technology/ Architecture / Building Trades** • **Question 5** (***Topic 2: Basic Geometric Figures & Measurement -Surface Area & Volume***) situates mathematical reasoning within a construction and engineering context, requiring students to: o Model physical structures using geometric solids (cylinders) o Apply volume and surface area formulas to determine material requirements o Interpret units and scaling across multiple objects o Make practical decisions (minimum number of concrete bags, gallons of paint). **Education/ Psychometrics / Educational Measurement/ Social Sciences**	SLO 6: Apply mathematical methods to problems in other fields of study.

• **Question 8** (***Topic 6: Measures of Center – mean; Topic 7: Measures of Variation- standard deviation and normal distribution***) This task uses authentic standardized testing data, requiring students to: o Analyze real-world educational data using statistical measures, o Interpret variability and distribution of student performance, o Draw conclusions about typical performance and spread. **Public Health/ Epidemiology/ Biostatistics** • **Question 9** (***Topic 6: Measures of Center, Variability & Distribution***) places probability and conditional reasoning within a health research context, requiring students to: o Interpret contingency tables derived from survey data, o Compute marginal and conditional probabilities, o Evaluate statistical independence to determine relationships between variables.	