George Mason University
College of Education and Human Development
Graduate School of Education
Mathematics Education Leadership

MATH 612. 6M3; 6M7 – Probability and Statistics for K-8 Teachers
3 Credits, Spring 2024
Thursdays 4:30 - 7:10; Synchronous Online

Faculty

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Prerequisites/Corequisites

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Junior Plus, Non-Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Students in a Non-Degree Undergraduate degree may not enroll.

University Catalog Course Description

An introduction to probability, descriptive statistics, and data analysis. Topics studied will include the exploration of randomness, data representation, modeling. Descriptive statistics will include measures of central tendency, dispersion, distributions, and regression. The analysis of experiments requiring hypothesizing, experimental design and data gathering will also be discussed. Offered by Mathematics. May not be repeated for credit.

Course Overview

This course is for future K-8 mathematics teacher specialists will cover the Virginia SOL strands in probability and statistics, especially those in grades 5-8. Special attention will be given to interpreting and assessing students' work and learning.

Course Delivery Method

This course will be delivered online using a synchronous format via Blackboard Learning Management system (LMS) housed in the MyMason portal. You will log in to the Blackboard (Bb) course site using your Mason email name (everything before @masonlive.gmu.edu) and email password. The course site will be available on January 16, 2024.

Under no circumstances, may candidates/students participate in online class sessions (either by phone or Internet) while operating motor vehicles. Further, as expected in a face-to-face class meeting, such online participation requires undivided attention to course content and communication.

Technical Requirements

To participate in this course, students will need to satisfy the following technical requirements:

- High-speed Internet access with standard up-to-date browsers. To get a list of Blackboard's supported browsers see: https://help.blackboard.com/Learn/Student/Ultra/Getting_Started/Browser_Support
- Students must maintain consistent and reliable access to their GMU email and Blackboard, as these are the official methods of communication for this course.
- Students will need a headset with a microphone for use with the Zoom conferencing tool. Students may not have background noise interruptions using the Zoom conferencing tool.
- Students may be asked to create logins and passwords on supplemental websites and/or to download trial software to their computer or tablet as part of course requirements.

Expectations

- Course Week:
  Our course week will begin on the day that our synchronous meetings take place as indicated on the Schedule of Classes.
- Log-in Frequency:
  Students must actively check the course Blackboard site and their GMU email for communications from the instructor, class discussions, and/or access to course materials at least once per week, and at should check email one hour before class begins for any last minute updates. In addition, students must log-in for all scheduled online synchronous meetings.
- Participation:
  Students are expected to actively engage in all course activities throughout the semester, which includes viewing all course materials, completing course activities and assignments, and participating in course discussions and group interactions.
- Technical Competence:
  Students are expected to demonstrate competence in the use of all course technology. Students who are struggling with technical components of the course are expected to seek assistance from the instructor and/or College or University technical services.

- Technical Issues:
  Students should anticipate some technical difficulties during the semester and should, therefore, budget their time accordingly. Late work will not be accepted based on individual technical issues.
- Workload:
  Please be aware that this course is **not** self-paced. Students are expected to meet *specific deadlines* and *due dates* listed in the **Class Schedule** section of this syllabus. It is the student's responsibility to keep track of the weekly course schedule of topics, readings, activities and assignments due.
- Instructor Support:
  Students may schedule a one-on-one meeting to discuss course requirements, content or other course-related issues. Students can schedule a Zoom meeting with the instructor.
- Netiquette:
  The course environment is a collaborative space. Experience shows that even an innocent remark typed in the online environment can be misconstrued. Students must always re-read their responses carefully before posting them, so as others do not consider them as personal offenses. *Be positive in your approach with others and diplomatic in selecting your words*. Remember that you are not competing with classmates, but sharing information and learning from others. All faculty are similarly expected to be respectful in all communications.
- Accommodations:
  Online learners who require effective accommodations to insure accessibility must be registered with George Mason University Disability Services.

Learner Outcomes or Objectives

This course is designed to enable students to do the following:

1. Develop a comprehensive understanding of probability and statistics reasoning, representation and data collection.
2. Examine in depth probability and statistics content appropriate for K-8 mathematics teachers, including the use of technology to study probability and statistics and historical connections to probability and statistics.
3. Explore the fundamentals of data collection, data analysis, probability, statistics, and relationships.
4. Examine probability and statistics Habits of Mind, in order to assess their own progress throughout the course and to discover these models' pedagogical implications on classroom instruction.

Professional Standards (National Council of Teachers of Mathematics (NCTM NCATE Mathematics Content for Elementary Mathematics Specialist Addendum to the NCTM NCATE Standards 2012)

Upon completion of this course, students will have met the following professional standards:

C.4.1 Statistical variability and its sources and the role of randomness in statistical inference
C.4.2 Construction and interpretation of graphical displays of univariate and bivariate data distributions (e.g., box plots and histograms), summary measures (mean, median, mode, interquartile range, and mean absolute deviation) and comparison of distributions of univariate data, and exploration of categorical (discrete) and measurement (continuous) data
C.4.3 Empirical and theoretical probability for both simple and compound events
C.4.4 Random (chance) phenomena and simulations
C.4.5 Historical development and perspectives of statistics and probability including contributions of significant figures and diverse cultures

Standard 2: Mathematical Practices

In their role as teacher, lead teacher, and/or coach/mentor, elementary mathematics specialist candidates:

3a) Apply knowledge of curriculum standards for elementary mathematics and their relationship to student learning within and across mathematical domains in teaching elementary students and coaching/mentoring elementary classroom teachers.
3c) Plan and assist others in planning lessons and units that incorporate a variety of strategies, differentiated instruction for diverse populations, and mathematics-specific instructional technologies in building all students' conceptual understanding and procedural proficiency.
3e) Implement and promote techniques related to student engagement and communication including selecting high quality tasks, guiding mathematical discussions, identifying key mathematical ideas, identifying and addressing student misconceptions, and employing a range of questioning strategies.
5b) Engage students and coach/mentor teachers in using developmentally appropriate mathematical activities and investigations that require active engagement and include mathematics-specific technology in building new knowledge.

Required Texts

Weekly readings will be posted in the Blackboard Learning Management System (LMS). Students will need to log into the University Library in order to access these readings.

Course Performance Evaluation

Students are expected to submit all assignments on time in the manner outlined by the instructor (e.g., Blackboard, VIA).

All assignments require APA formatting. See recommended texts for resources on APA formatting. Specifically, the following aspects of APA formatting should be addressed in any submission:

- 12 point, Times New Roman font
- Double spaced
- Page headers/Running head
- Cover page with title, author's name and professional affiliation
- References
- Headings
- Citations
- Clearly organized, grammatically correct, coherent and complete
- Professional language (i.e. no jargon)

- **Assignments and/or Examinations**
  - **A. Reflections (30%) - Performance Based Assessment**
    NCATE/NCTM Indicator 1a (C.4.1, C.4.3, C.4.4), 2a, 2b, 2c, 2f
    In each reflection, the student must:
    - Demonstrate and apply knowledge of major mathematics concepts, algorithms, procedures, applications in varied contexts and connections.
    - Use problem solving to develop conceptual understanding, make a sense of a wide variety of problems and persevere in solving them, apply and adapt a variety of strategies in solving problems confronted within the field of mathematics and other contexts, and formulate and test conjectures in order to frame generalizations.
    - Reason abstractly, reflectively, and quantitatively with attention to units, constructing viable arguments and proofs, and critiquing the reasoning of others; represent and model generalizations using mathematics; recognize structure and express regularity in patterns of mathematical reasoning; use multiple representations to model and describe mathematics; and utilize appropriate mathematical vocabulary and symbols to communicate mathematical ideas to others.
    - Formulate, represent, analyze, and interpret mathematical models derived from real-world contexts of mathematical problems.
    - Use and assist teachers in using resources from professional mathematics education organizations such as teacher/leader discussion groups, teacher networks, and print, digital, and virtual resources/collections
    - Write the reflection using APA formatting.

    a. Reflection 1 (10%)
    Students will reflect on a rich mathematical task about statistical variability and its sources and the role of randomness in statistical inference (C.4.1).

    b. Reflection 2 (10%)
    Students will reflect on a rich mathematical task about empirical and theoretical probability for both simple and compound events (C.4.3).

    c. Reflection 3 (10%)
    Students will reflect on a rich mathematical task about Random (chance) phenomena and simulations (C.4.4).

B. Historical/Cultural Presentation (10%) - Performance Based Assessment

NCTM Indicator 1a (C.4.5)

Students will research the historical and/or cultural impact of probability, statistics, and data literacy and present their topic during a 5-10 minute period on a date that they select at the beginning of the semester. Topics must be specific to probability, statistics and data literacy. Students must ensure that they are pronouncing names correctly, and that they have a full understanding of the material being presented to the class.

C. Vertical Tool Kit Investigation (15%) - Performance Based Assessment

NCATE/NCTM Indicator 1a (C.4.2), 2a, 2b, 2c, 2f

Students will explore a variety of tools (technology based and physical tools) that are used for teaching probability, statistics, and data literacy. They will work in vertical teams (diverse grade levels) in order to identify tools that can be used across grades K-8. All students in the group must be familiar with all tools in their Vertical Tool Kits (even tools for grades that they do not teach). Student teams will present their Vertical Tool Kits to similar grade level teams as part of the Co-constructed Evaluation of Tools project.

D. Co-constructed Evaluation of Tools (15%)

This co-constructed project will give students an opportunity to be creators of emerging research and evaluation tools in the field of K-8 data literacy. Students will investigate current research on evaluation of tools and create a rubric based on this research that can be used in the field of mathematics education. Students will have the opportunity to present this tool at the Virginia Council of Teachers of Mathematics annual conference in June to increase their leadership and presentation skills.

E. Rich Data Investigation (20%)

Students will create a rich task project that includes exploration of a mathematical topic that can be discovered using a tool from the Vertical Tool Kit Investigation assignment. They will implement the task in a K-8 classroom. Then, they will prepare a 8-10 minute interactive presentation for teachers that showcases the task, tool, and student work. The presentation must be interactive and engage teachers in using the tool to explore a task.

F. Participation (10%)

A commitment to participation in class discussions and course activities depends heavily and primarily on the regular attendance and participation of all involved. Participation will include taking part in discussions informed by critical reading and thinking, leading discussions about selected mathematics problems, and sharing with the class the products of various writing, reflection, lesson planning, and field experience assignments. The expectations, demands and workload of this course are professional and high. This requires students to consider data using different strategies and a variety of manipulatives and resources. During math work time, students should be developing strategies and non-traditional algorithms for the entire work time or discussing and sharing algorithms with each other. During math-talk and discussion times, students should be actively engaged by voicing or typing their thoughts and connecting to topics presented during the discussion.

Participation in this course requires a commitment to reading reflectively and critically the assigned readings. The readings will be used to provide a framework and coherent theme to the course content. They have been selected to introduce themes in professional development as well as research and critical commentary on current issues in mathematics education.

- **Other Requirements**
  It is your responsibility to attend all class sessions. Please report your reasons for any absences to the instructor in writing. It is your responsibility to be on time for each class session. Please report your reasons for any tardiness to the instructor in writing.

  Class materials will be posted for each class session on Blackboard. Students are responsible for reviewing these materials and submitting required artifacts (where appropriate) to online class discussion boards. All assignments are to be turned in to your instructor on time. Late work will not be accepted for full credit. Assignments turned in late will receive a 10% deduction from the grade per late day or any fraction thereof (including weekends and holidays).

- **Grading**

A 93%-100%	B+ 87%-89%	C 70%-79%
A- 90%-92%	B 80%-86%	F Below 70%

  For Master's Degrees:
  Candidates must have a minimum GPA of 3.00 in coursework presented on the degree application, which may include no more than 6 credits of C. (Grades of C+, C-, or D do not apply to graduate courses. The GPA calculation excludes all transfer courses and Mason non-degree studies credits not formally approved for the degree).

  For Endorsement Requirements:
  Candidates must have a grade of B or higher for all licensure coursework (endorsement coursework).

Professional Dispositions

See https://cehd.gmu.edu/students/policies-procedures/

Students are expected to exhibit professional behaviors and dispositions at all times.

In addition to being punctual, students are expected to actively participate and engage in assignments and class discussions. In order to maintain a focused class, devices and cell phones are to be used exclusively for the current class topic. Examples of this include searching for math standards, videos of mathematical algorithms, taking pictures of manipulatives, etc. Emailing,

texting, shopping, and other forms of communication and social media are not permitted during class time unless it is directly related to the activity. In addition, students should refrain from grading papers and preparing lesson materials for their school placements during class time.

Class Schedule

Date & Topic	**Assignments Due**
1/18 Why data literacy? What is data literacy? Data Cycle Instructional Shifts for Data Literacy Data Talks Gaise II: Lady Bug Investigation	
1/25 Data Talk Data Investigation 1: Exploratory Data Analysis (CODAP) Mammals Historical Reflection Introduction to Technology Tools	Gaise II Reading; Data-Focused Article
2/1 Data Talk Data Investigation 2 Historical Reflection Review Technology Tools	Gaise II Reading Reflection 1 (10%)
2/8 Data Talk Data Investigation 3 Historical Reflection Review Technology Tools	Gaise II Reading; Data-Focused Article
2/15 Data Talk Data Investigation 4 Historical Reflection Rich Task Project Investigation	Gaise II Reading Vertical Tool Kit Investigation (10%)
2/22 Data Talk Data Investigation 5 Historical Reflection	Reflection 2 (10%)

2/29 Data Talk Data Investigation 6 Computer Science Coding Historical Reflection	Data-Focused Article
3/14 Data Investigation 7 Computer Science Coding Historical Reflection	Reflection 3 (10%)
3/21 Data Investigation 8 Historical Reflection	Data-Focused Article
3/28 *ASYNCH	
4/4 Data Investigation 9 Historical Reflection	Co-constructed evaluation of tools (10%)
4/11 Data Investigation 10 Historical Reflection	Data-Focused Article
4/18 Data Investigation 11 Historical Reflection	Rich Task Data Investigation with Student Work (20%)
4/25 Rich Task Presentations	Final Uploads of Historical Reflection 5 (10%)

Note: Faculty reserves the right to alter the schedule as necessary, with notification to students.

Core Values Commitment

The College of Education and Human Development is committed to collaboration, ethical leadership, innovation, research-based practice, and social justice. Students are expected to adhere to these principles: http://cehd.gmu.edu/values/.

GMU Policies and Resources for Students

Policies

- Students must adhere to the guidelines of the Mason Honor Code (see https://catalog.gmu.edu/policies/honor-code-system/).

- Students must follow the university policy for Responsible Use of Computing (see https://universitypolicy.gmu.edu/policies/responsible-use-of-computing/).

- Students are responsible for the content of university communications sent to their Mason email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students **solely** through their Mason email account.

- Students with disabilities who seek accommodations in a course must be registered with George Mason University Disability Services. Approved accommodations will begin at the time the written letter from Disability Services is received by the instructor (see https://ds.gmu.edu/).

- Students must silence all sound emitting devices during class unless otherwise authorized by the instructor.

Campus Resources

- Support for submission of assignments to VIA should be directed to viahelp@gmu.edu or https://cehd.gmu.edu/aero/assessments. Questions or concerns regarding use of Blackboard should be directed to https://its.gmu.edu/knowledge-base/blackboard-instructional-technology-support-for-students/.

- For information on student support resources on campus, see https://ctfe.gmu.edu/teaching/student-support-resources-on-campus

Notice of mandatory reporting of sexual assault, sexual harassment, interpersonal violence, and stalking:

As a faculty member, I am designated as a "Non-Confidential Employee," and must report all disclosures of sexual assault, sexual harassment, interpersonal violence, and stalking to Mason's Title IX Coordinator per University Policy 1202. If you wish to speak with someone confidentially, please contact one of Mason's confidential resources, such as Student Support and Advocacy Center (SSAC) at 703-380-1434 or Counseling and Psychological Services (CAPS) at 703-993-2380. You may also seek assistance or support measures from Mason's Title IX Coordinator by calling 703-993-8730, or emailing titleix@gmu.edu.

For additional information on the College of Education and Human Development, please visit our website https://cehd.gmu.edu/students/.

Participation Rubric

Rational Numbers Participation Rubric				
Level/Criteria	**4**	**3**	**2**	**1**
	Exceeds Expectations	**Meets Expectations**	**Developing**	**Does Not Meet Expectations**
A commitment to participation in class discussions and course activities depends heavily and primarily on the regular attendance and participation of all involved. Participation will include taking part in discussions informed by critical reading and thinking, leading discussions about selected mathematics problems, and sharing with the class the products of various writing, reflection, lesson planning, and field experience assignments. The expectations, demands and workload of this course are professional and high. This requires students to consider number systems and number theory using different strategies and a variety of manipulatives and resources. During math work time, students should be developing strategies and non-traditional algorithms for the entire work time or discussing and sharing algorithms with each other. During math-talk and discussion times, students should be actively engaged by voicing their thoughts and connecting to topics presented during the discussion. Participation in this course requires a commitment to reading reflectively and critically the assigned readings. The readings will be used to provide a framework and coherent theme to the course content. They have been selected to introduce themes in professional development as well as research and critical commentary on current issues in mathematics education.	Student attends all 13 classes. Student arrives on time to all 13 classes. Student engages in discussion through multiple modalities in all 13 classes. Student engages in small group work in all 13 classes.	Student attends 12 classes. Student arrives on time to 12 classes. Student engages in discussion through multiple modalities in 12 classes. Student engages in small group work in 12 classes.	Student attends 11 classes. Student arrives on time to 11 classes. Student engages in discussion through multiple modalities in 11 classes. Student engages in small group work in 11 classes.	Student attends 10 or less classes. Student arrives on time to 10 or less classes. Student engages in discussion through multiple modalities in 10 or less classes. Student engages in small group work in 10 or less classes.

Prob/Stat Rich Task Reflection

Course Performance Based Assessment

Reflection Logs 1-4 Rubric

Level/Criteria	4	3	2	1
	Exceeds Expectations	**Meets Expectations**	**Developing**	**Does Not Meet Expectations**
BUILDING CONCEPTUAL AND PROCEDURAL UNDERSTANDING **NCTM Element 1.a** Demonstrate and apply knowledge of major mathematics concepts, algorithms, procedures, applications in varied contexts and connections.	The candidate includes all of the following elements: • Application of conceptual and procedural knowledge in identifying solutions in the problem set • Explanation of the development of conceptual to procedural knowledge • Discussion of new knowledge gained and the connections to past knowledge and experiences	The candidate includes two of the following elements: • Application of conceptual and procedural knowledge in identifying solutions in the problem set • Explanation of the development of conceptual to procedural knowledge • Discussion of new knowledge gained and the connections to past knowledge and experiences	The candidate includes one of the following elements: Application of conceptual and procedural knowledge in identifying solutions in the problem set Explanation of the development of conceptual to procedural knowledge Discussion of new knowledge gained and the connections to past knowledge and experiences	The candidate does not include any of following elements: Application of conceptual and procedural knowledge in identifying solutions in the problem set Explanation of the development of conceptual to procedural knowledge Discussion of new knowledge gained and the connections to past knowledge and experiences
PROBLEM SOLVING **NCTM Element 2.a** Use problem solving to develop conceptual understanding, make a sense of a wide variety of problems and persevere in solving them, apply and adapt a variety of strategies in solving problems confronted within the field of mathematics and other contexts, and formulate and test conjectures in order to frame generalizations.	The candidate includes all of the following elements: • Describes the use of problem solving within the problem set to formulate generalizations • Explains how to make sense of the problems in the problem set • Apply a variety of strategies and representations to the problem set	The candidate includes two of the following elements: • Use of problem solving within the problem set to formulate generalizations • Make sense of the problems in the problem set • Apply a variety of strategies and representations to the problem set	The candidate includes one of the following elements: • Use of problem solving within the problem set to formulate generalizations • Make sense of the problems in the problem set • Apply a variety of strategies and representations to the problem set	The candidate does not include any of following elements: Use of problem solving within the problem set to formulate generalizations Make sense of the problems in the problem set Apply a variety of strategies and representations to the problem set

REPRESENTATIONS **NCTM Element 2.b** Reason abstractly, reflectively, and quantitatively with attention to units, constructing viable arguments and proofs, and critiquing the reasoning of others; represent and model generalizations using mathematics; recognize structure and express regularity in patterns of mathematical reasoning; use multiple representations to model and describe mathematics; and utilize appropriate mathematical vocabulary and symbols to communicate mathematical ideas to others.	The candidate includes all of the following elements: • Describes how multiple representations were used to model the problem set • Discusses how the representations support the creation of generalizations • Uses appropriate mathematical vocabulary and symbols	The candidate includes two of the following elements: • Describes how multiple representations were used to model the problem set • Discusses how the representations support the creation of generalizations • Uses appropriate mathematical vocabulary and symbols	The candidate includes one of the following elements: • Describes how multiple representations were used to model the problem set • Discusses how the representations support the creation of generalizations • Uses appropriate mathematical vocabulary and symbols	The candidate does not include any of following elements: • Describes how multiple representations were used to model the problem set • Discusses how the representations support the creation of generalizations • Uses appropriate mathematical vocabulary and symbols
CONTEXT **NCTM Element 2.C** Formulate, represent, analyze, and interpret mathematical models derived from real-world contexts of mathematical problems.	The candidate includes all of the following elements: ● An example of a similar problem with a different context. ● An analysis of a similar problem (compare and contrast) ● An interpretation of the solution	The candidate includes two of the following elements: • An example of a similar problem with a different context. • An analysis of a similar problem (compare and contrast) • An interpretation of the solution	The candidate includes one of the following elements: • An example of a similar problem with a different context. • An analysis of a similar problem (compare and contrast) • An interpretation of the solution	The candidate does not include any of following elements: • An example of a similar problem with a different context. • An analysis of a similar problem (compare and contrast) • An interpretation of the solution
NCTM PROCESS STANDARDS **NCTM Element 2.F** Use and assist teachers in using resources from professional mathematics education organizations such as teacher/leader discussion groups, teacher networks, and print, digital, and virtual resources/ collections	The candidate includes a reflection on the process standards that includes a description of how each of the five NCTM Process Standards impact the mathematical understanding. The reflection includes specific instances where the candidate assisted teachers using all	The candidate includes a reflection on the process standards that includes a description of how four of the five NCTM Process Standards impact the mathematical understanding. The reflection includes specific instances where the candidate assisted teachers	The candidate includes a reflection on the process standards that includes a description of how three of the five NCTM Process Standards impact the mathematical understanding. The reflection includes specific instances where the candidate assisted teachers	The candidate includes a reflection on the process standards that includes a description of how one or two NCTM Process Standards impact the mathematical understanding. The reflection does not include any specific instances where the candidate

	of the following elements: • Teacher/Leader discussion groups • Teacher networks • Print, digital, and virtual resources/ collections	using two of the following elements: • Teacher/Leader discussion groups • Teacher networks • Print, digital, and virtual resources/ collections	using one of the following elements: • Teacher/Leader discussion groups • Teacher networks • Print, digital, and virtual resources/ collections	assisted teachers using all of the following elements: • Teacher/Leader discussion groups • Teacher networks • Print, digital, and virtual resources/ collections
PAPER ORGANIZATION	The paper organization includes all of the following: • A cover page with title, author's name, and professional affiliation. • The paper is well-organized, grammatically correct, coherent, and complete. • The paper has distinctive focus and voice. • The paper uses professional language (i.e., no jargon). • The paper is presented in an accessible style. • The paper meets APA formatting guidelines.	The report organization includes five of the following: • A cover page with title, author's name, and professional affiliation. • The paper is well-organized, grammatically correct, coherent, and complete. • The paper has distinctive focus and voice. • The paper uses professional language (i.e., no jargon). • The paper is presented in an accessible style. • The paper meets APA formatting guidelines.	The report organization includes four of the following: • A cover page with title, author's name, and professional affiliation. • The paper is well-organized, grammatically correct, coherent, and complete. • The paper has distinctive focus and voice. • The paper uses professional language (i.e., no jargon). • The paper is presented in an accessible style. • The paper meets APA formatting guidelines.	The report organization includes three or fewer of the following: • A cover page with title, author's name, and professional affiliation. • The paper is well-organized, grammatically correct, coherent, and complete. • The paper has distinctive focus and voice. • The paper uses professional language (i.e., no jargon). • The paper is presented in an accessible style. • The paper meets APA formatting guidelines.

Historical/Cultural Presentation - Performance Based Assessment

Levels/Criteria	4	3	2	1
	Exceeds Expectations	**Meets Expectations**	**Developing**	**Does Not Meet Expectations**
NCTM Indicator C.1.5 Historical development of probability and statistics.	Presentation describes the historical development of probability and statistics in depth and provides specific examples.	Presentation describes the historical development of probability and statistics and provides specific examples.	Presentation describes the historical development of probability and statistics and provides an example.	Presentation includes incomplete descriptions of historical development of probability and statistics.
NCTM Indicator C.1.5 Historical perspectives of probability and statistics.	Presentation describes the historical perspectives of probability and statistics in depth and provides specific examples.	Presentation describes the historical perspectives of probability and statistics and provides specific examples.	Presentation describes the historical perspectives of probability and statistics and provides an example.	Presentation includes incomplete descriptions of historical perspectives of probability and statistics.
NCTM Indicator C.1.5 Contributions of historically significant figures and diverse cultures.	Presentation describes contributions of historically significant figures and diverse cultures in depth and provides specific examples.	Presentation describes contributions of historically significant figures and diverse cultures and provides specific examples.	Presentation describes contributions of historically significant figures and diverse cultures and provides an example.	Presentation includes incomplete descriptions of historically significant figures and diverse cultures.
Organization	The presentation includes all of the following: A cover slide with title, author's name, and professional affiliation. The presentation is well-organized, grammatically correct, coherent, and complete. The presentation has a distinctive focus and voice. The presentation uses professional language (i.e., no jargon), and the presenter uses	The presentation includes five of the following: A cover slide with title, author's name, and professional affiliation. The presentation is well-organized, grammatically correct, coherent, and complete. The presentation has a distinctive focus and voice. The presentation uses professional language (i.e., no jargon), and the presenter uses	The presentation includes four of the following: A cover slide with title, author's name, and professional affiliation. The presentation is well-organized, grammatically correct, coherent, and complete. The presentation has a distinctive focus and voice. The presentation uses professional language (i.e., no jargon), and the presenter uses	The presentation includes three or fewer of the following: A cover slide with title, author's name, and professional affiliation. The presentation is well-organized, grammatically correct, coherent, and complete. The presentation has a distinctive focus and voice. The presentation uses professional language (i.e., no jargon), and the

	correct pronunciation of historical and cultural names. The presentation is presented in an accessible style.	correct pronunciation of historical and cultural names. The presentation is presented in an accessible style.	correct pronunciation of historical and cultural names. The presentation is presented in an accessible style.	presenter uses correct pronunciation of historical and cultural names. The presentation is presented in an accessible style.