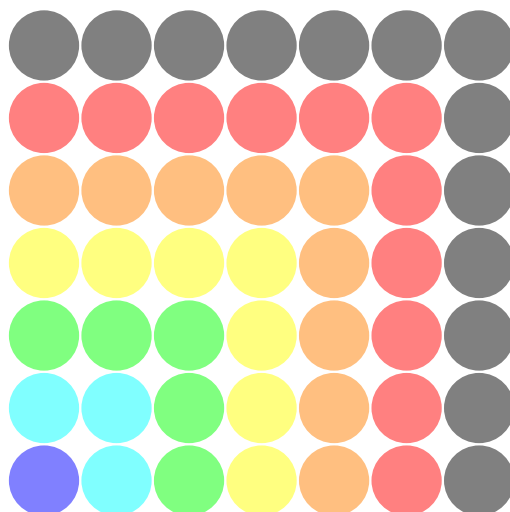# MATHEMATICS EDUCATION HANDBOOK

FOURTH EDITION

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This document was created with LaTeX.

The figure on the front cover is a "proof without words" of the identity expressing the sum of the first n odd natural numbers: $1 + 3 + 5 + 7 + \cdots + (2n - 1) = n^2$. The figure was created with Geometer's Sketchpad.

Preface

This handbook is primarily for Mathematics Education Teacher Candidates (Grades 7-12). Chapter 3 *Field Placements* also contains pertinent information for cooperating teachers. The handbook is subject to change at any time. Information in the college catalogue supersedes information in this handbook. The handbook is divided into the following chapters.

| Chapter 1: Introduction: Program description; Curriculum; Entrance Requirements |

| Chapter 2: New York State Certification Exams |

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Chapter 1

Introduction

1.1 Program Description

The Bachelor of Science in Mathematics Education is a 4-year program designed to prepare candidates to become effective mathematics teachers in grades 7 through 12. The program meets the need in New York State for teachers with solid mathematical backgrounds coupled with extensive pedagogical expertise.

Illustrating the program's focus on mathematics and the mathematics classroom is the fact that it is housed in the Department of Mathematics: This feature is unique among mathematics eduction programs at CUNY, and is rare within New York State.

Additional key features of the program include extensive teaching experience in middle and high school mathematics classrooms; considerable exposure to applications of mathematics across various professions; and mathematics training sufficiently rigorous to prepare candidates for entry into a graduate program in mathematics.

1.2 Description of Curriculum

The curriculum of the Bachelor of Science in Mathematics Education may be divided into 4 components: Mathematics; Pedagogy; General Education; and Applications of Mathematics. A total of 120 credits is required to complete the program. The lists below contain the courses within each component. The lists are guides only, and the college catalog should be consulted for

more detailed information.

Mathematics Component

- MAT 1475 Calculus I (4 credits)

- MAT 1476 Calculus Laboratory (1 credit)

- MAT 1575 Calculus II (4 credits)

- MAT 2071 Introduction to Proofs and Logic (4 credits)

- MAT 2572 Probability and Mathematical Statistics I (4 credits)

- MAT 2580 Introduction to Linear Algebra (3 credits)

- MAT 2630 Numerical Methods (3 credits)

- MAT 3021 Number Theory (4 credits)

- MAT 3050 Geometry I (4 credits)

- MAT 3075 Introduction to Real Analysis (4 credits)

- MAT 3080 Modern Algebra (4 credits)

- MAT 4030 History of Mathematics (3 credits)

- MAT 4050 Geometry II (3 credits)

Pedagogy Component

- MEDU 1010 Foundations of Mathematics Education (3 credits)

- MEDU 1021 Teaching and Learning Strategies (3 credits)

- MEDU 2010 Technology in Math Ed. (2 credits)

- MEDU 3011 Methods of Teaching I (4 credits)

- MEDU 3020 Methods of Teaching II (4 credits)

- MEDU 4010 Supervised Student Teaching I (3 credits)

- MEDU 4020 Supervised Student Teaching II (3 credits)

- PSY 1101 Introduction to Psychology (3 credits)

- PSY 2501 Child and Adolescent Development (3 credits)

- PSY 3502 Human Learning and Instruction (3 credits)

- EDU 2455 Special Needs Students (3 credits)

- EDU 4600 Professional Development Seminar (2 credits)

General Education Component

- ENG 1101 English Composition I (3 credits)

- ENG 1121 English Composition II (3 credits)

- COM 1330 Effective Speaking (3 credits)

- Foreign Language Requirement (3 credits)

- Interdisciplinary Requirement (3 credits)

- US Experience in its Diversity Requirement (3 credits)

- Creative Expression Requirement (3 credits)

- One additional Gen. Ed. course (3 credits)

- Two science courses (6-10 credits)

Mathematical Applications Component (Select courses to make 120 credits)

- ARCH 2480 Principles of Stability in Structures (3 credits)

- ARCH 3522 A History of New York City Architecture (3 credits)

- ARCH 3551 Sustainability: History and Practice (3 credits)

- ARCH 3640 Historic Preservation Theory and Practice (3 credits)

- ARCH 4880 Survey of Structural Systems (3 credits)

- EET 1102 Techniques of Electrical Technology (2 credits)

- EET 1122 Circuit Analysis I (4 credits)

- EET 1222 Circuit Analysis II (5 credits)

- PHYS 2443 Physics 3.3 (4 credits)

- PHYS 2605 Introduction to Laser Physics/Photonics (4 credits)

- PHYS 1117 Astronomy I (4 credits)

- CET 3510 Microcomputer Systems Technology (4 credits)

- CET 3525 Electrical Networks (4 credits)

- CET 3625 Applied Analysis Laboratory (1 credit)

- CET 3640 Software For Computer Control (3 credits)

- CET 4705 Component and Subsystem Design I (2 credits)

- CET 4773 Microcomputer Interfacing (4 credits)

- CET 4805 Component and Subsystem Design II (2 credits)

- CST 1101 Problem Solving with Computer Prog. (3 credits)

- CST 2403 C++ Programming I (3 credits)

- CST 3503 C++ Programming II (3 credits)

- MAT 2675 Calculus III (4 credits)

- MAT 3672 Probability and Mathematical Statistics II (4 credits)

- MAT 2680 Differential Equations (3 credits)

- MAT 3770 Mathematical Modeling I (3 credits)

- MAT 4880 Mathematical Modeling II (3 credits)

- MEDU 2901 Peer Leader Training (1 credits)

1.3 Admission Requirements

The current requirements for entry into the Mathematics Education program are as follows:

Freshman Criteria

- Minimum 76 high school average.

- Minimum 1100 SAT scores (550 on math SAT).

- Minimum 3 units of high school math (should provide preparation to enter MAT 1475 Calculus I).

Transfer Criteria

- Must be CUNY proficient (reading, writing, and math)

- Must have a minimum cumulative GPA of 2.0.

- Must have completed prerequisites for MAT 1475 Calculus I or higher.

Chapter 2

Certification Exams

The New York State Education Department (NYSED) requires that Mathematics Grades 7-12 teacher candidates pass the following exams for initial certification:

- Teacher Performance Assessment (edTPA)

- Educating All Students Test (EAS)

- Academic Literacy Test (ALST)

- Revised Content Specialty Test Mathematics (CST)

Recommended sequence of taking the certification exams:

- ALST: Befor enrolling in MEDU 4010 and MEDU 4020.

- CST: In the summer prior to doing MEDU 4010 and MEDU 4020.

- edTPA: In conjunction with MEDU 4010 and MEDU 4020.

- EAS: After completion of EDU 2610 Child and Adolescent Development and EDU 2455 Methods and Material for Special Needs Students.

2.1 edTPA

edTPA is a summative, subject–specific portfolio–based assessment of teaching performance, completed during a preparation program within a clinical

field experience. edTPA is designed to assess a teaching candidates' readiness for licensure.

The edTPA is a multiple measure assessment of teaching focused on student learning. Teacher candidates submit authentic artifacts (lesson plans, video clips of instruction, student work samples) from their actual teaching during a student teaching placement in MEDU 4010 or MEDU 4020. Candidates also submit commentaries that provide a rationale to support their instructional practices based on student learning strengths and needs. Candidates' evidence is evaluated across five scoring components of teaching: Planning, Instruction, Assessment, Analysis of Teaching, and Academic Language.

- Registration for the edTPA will be done in MEDU 4010 and MEDU 4020.

- Preparation material may be found at the edTPA website: www.edtpa.com.

- The minimum passing score determined by NYS is provided on edTPA website.

- Fee $300

2.2   EAS

The Educating All Students test consists of selected-response items and constructed-response items. Each constructed-response item will share scenario-based stimulus material with several selected-response items. The EAS test measures the professional and pedagogical knowledge and skills necessary to teach all students diverse student populations, English language learners, students with disabilities - effectively in New York State public schools.

- The EAS is a computer based test.

- Registration on the NYSTCE website: www.nystce.nesinc.com.

- The minimum passing score is 520 out of 600.

- Test Length: 2.25 hours.

- EAS preparation guide.

- EAS Practice Test ($29.95).

- Fee $102

2.3   ALST

The Academic Literacy Skills Test consists of selected-response items, two focused constructed-response items, and one extended written assignment. The ALST measures academic literacy skills–reading, writing to sources– necessary to teach effectively in New York State public schools.

- The ALST is a computer based test.

- Registration on the NYSTCE website: https://www.nystce.nesinc.com.

- The minimum passing score is 520 out of 600.

- Test Length: 3.5 hours.

- ALST preparation guide.

- ALST Practice Test ($29.95).

- Fee $131

2.4   CST

The CST Mathematics consist of multiple-choice questions and a written assignment. The CST measures knowledge and skills in mathematics and mathematics pedagogy.

- The CST may be take computer based or paper based.

- Registration on the NYSTCE website: www.nystce.nesinc.com.

- The minimum passing score is 520 out of 600.

- Test Length: 4 hours.

- CST preparation guide.

- Fee $119 computer based; $79 paper based.

Chapter 3

Field Placements

3.1 Introduction

There are two types of field placements that candidates will experience: **Field observation**, and **student teaching**. Two placements will be field observations placements; one in a grade 7 to 9 classroom and the other in a grade 10 to 12 classroom. Two placements will be student teaching placements; one in a grade 7 to 9 classroom and the other in a grade 10 to 12 classroom.

Field observation placements are each 60 hours in duration, and student teaching placements are each 120 hours. Candidates in field placements should go to their participating school at least twice per week, and more than twice per week is recommended.

The **field observation** placements provide candidates with experiences in a variety of communities and across the range of student developmental levels from grades 7 through 12, an opportunity for practicing skills and interacting with parents or caregivers, an opportunity to work in high-needs schools, and an opportunity to work with each of the following student populations: socioeconomically disadvantaged students, students who are English language learners, and students with disabilities.

The **student teaching** placements are perhaps the most important experiences in the program. It is here that candidates employ, and continue to develop, their mathematical and pedagogical knowledge and skills in grades 7 to 12 mathematics classrooms under the supervision of a cooperating teaching and a college supervisor.

The typical student teaching structure is one of gradual release of respon-

sibility. Under this model, the candidate gradually transitions into independent teaching through the following stages:

1. Introduction to school/class/students, observe cooperating teacher and/or other classrooms, identify target unit/lessons for independent teaching segment.

2. Involvement in cooperating teacher's lessons- teach small group lessons, assist students during independent/group work time, etc.

3. Transition to independent teaching- co-teaching, trading off lessons (cooperating teacher teaches first period, student teacher teaches second period), etc.

4. Independent teaching.

5. Transition back to cooperating teacher, all student work graded and returned, observe other classrooms if possible.

The exact timing of the stages will depend on the candidate and the cooperating teacher. Note that the edTPA will cover 3-5 lessons and the candidate will want to practice before they begin the official edTPA section. As such, candidates are encouraged to teach as many lessons as possible.

3.2   Field Observation Requirements

Field observation placements are done in MEDU 3011 and MEDU 3020. In addition to meeting the prerequisites of the appropriate course, candidates must:

- Must be registered on the Department of Educations's database system (PETS), and be fingerprinted with the Department of Education.

- Meet any additional requirement of the particular school at which the placement will occur.

- Submit the Field Placement Request Form to Program Director. The form must be submitted on semester in advance of a field placement.

3.3   Student Teaching Requirements

Field observation placements are done in MEDU 3011 and MEDU 3020. Student teaching is done in MEDU 4010 and MEDU 4020. In addition to meeting the prerequisites of the appropriate course, candidates must:

- Must be registered on the Department of Educations's database system (PETS), and be fingerprinted with the Department of Education.

- Familiarize yourself with Chancellor's regulations prior to teaching in a New York City Public School (Pupil Behavior and Discipline; Verbal Abuse; Child Abuse; Background Investigations)

- Meet any additional requirement of the particular school at which the placement will occur.

- Submit the Field Placement Request Form to Program Director. The form must be submitted on semester in advance of a field placement.

3.4   Fingerprinting

All candidates must be fingerprinted prior to doing a field placement. First, you must submit a field placement request form. The Department of Mathematics will nominate you for the Department of Education's database known as PETS. The DOE will contact you, after which you will go to the DOE's Division of Human Resources at 65 Court Street, Room 102, in downtown Brooklyn to be fingerprinted. Fee: $130.

3.5   Legal Issues

Section 3023 of the New York State Education Law requires that each school district protect candidates from financial loss arising out of any claim, demand, suit or judgment by reason of alleged negligence or other act resulting in accidental bodily injury to any person. This protection applies only if the candidate was performing duties within the scope of the position of student teacher.

Section 3001, Subsection 2 of the New York State Education Law states that a student teacher is legally permitted to student teach without the

presence of the certified teacher in the classroom if the classroom certified teacher is available at all times and retains supervision of the student teacher.

Candidates may not be used as paid or unpaid substitute teachers. They may, however, do student teaching under the supervision of a certified substitute teacher.

3.6   Cooperating Teachers Supervising Field Observations

The following is a list of expectations for cooperating teachers supervising a candidate in a field observation:

1. be knowledgeable about the information, policies, and procedures presented in this handbook

2. prepare for the teacher candidates pre-student teaching field experience. Before the teacher candidate arrives, it is important to convey to the students that they should look upon the teacher candidate as another teacher rather than as a student. The host teachers attitude about the fact that a teacher candidate will be joining him/her may be more revealing than the words used to inform students that a teacher candidate is in fact expected. The eagerness displayed by the host teacher and his/her willingness to take the time to discuss and make plans for the teacher candidate's arrival will demonstrate to the students the importance of the event. Students should share the responsibility in preparing for the teacher candidate.

3. respond to the teacher candidates initial contact

4. welcome the teacher candidate into the school, introducing him/her to students and colleagues

5. orient the teacher candidate to the school

6. integrate the teacher candidate into the school

7. arrange for observations of host teachers and other teachers

8. carefully plan for the teacher candidates first day and first week

9. provide initial assistance to the teacher candidate in making lesson plans

10. develop a long-range plan with the teacher candidate that aligns with the courses field component

11. monitor the teacher candidates attendance and report absences on the field log form provided by the teacher candidate

12. guide the teacher candidate toward available resources

13. complete a final, written evaluation which the teacher candidate will provide to be returned to the college instructor via the teacher candidate (this may vary according to program requirements)

3.7 Cooperating Teachers Supervising Student Teachers

Our candidates will depend on the rich opportunities that you will provide for them as well as their need to test out various teaching practices, create and teach their own lesson plans, video tape the required edTPA lessons, assess their students learning and learn to become reflective practioners. We have included in this Handbook suggestions, guidelines and basic information for you to consider along with your own mentoring expertise.

It is very important that the student teacher candidate is appropriately welcomed to your classroom and school. Our candidate will need to feel supported as s/he adjusts to your classroom and school routines and norms, develops relationships with students and colleagues, and most importantly, establishes her/himself as a "real" teacher.

The following lists ways in which a cooperating teaching can help student teacher candidates enter seamlessly into the classroom:

1. Speak with your students about the new "co-teacher" who will be joining your class. Be clear about the expectations for the students behavior and interactions with this "co-teacher" and answer any questions that they may have.

2. When your student teacher arrives, encourage your student teacher to learn the names and important background information of the students as quickly as possible.

3. You need to be prepared to spend some time talking with your student teacher. Explain your background, experience, work style and the particular norms and conventions of practice that are the foundation of your teaching. Get to know each other by encouraging your student teacher to share his/her goals, fears, talents, teaching needs, etc.

4. Introduce your student teacher to other faculty and personnel in the school.

5. Provide a work area for your student teacher and a space to store his/her personal belongings.

6. Acquaint your student teacher with curriculum materials, instructional supplies, teaching aids and other available equipment or technology.

7. Review the rules, regulations and practices of the school (i.e. Staff Manual).

8. Add the student teachers name to the classroom door and other materials distributed to students.

9. Review the issues of confidentiality with the student teacher.

Cooperating teachers should make every effort to gather information from the student teacher and establish lines of communication. Some examples include, but are not limited to:

1. Exchange phone numbers and email addresses and discuss how to best communicate with one another before and/or after school hours.

2. Review this Handbook.

3. Try to schedule a meeting at least once a week where you can plan together and discuss what has been going on and plans for the next few days.

4. Try to meet with your student teachers college supervisor as soon as possible. Ideally, this meeting should be a three-way meeting where you, the student teacher and the supervisor can discuss goals, progress and meeting the components of the edTPA.

5. Our college supervisors will be using an Observation Form include in Chapter 4. The form follows closely with the Danielson components that your principal is also using to observe you. Share your experiences with this observation process with your student teacher.

6. Our student teachers must complete a minimum of 120 hours during the semester. We recommend that s/he is with you for at least 3 days per week. Please be aware that the student teacher may need to leave early or arrive late on certain days due to courses.

3.8 Cooperating Teacher Requirements

Cooperating teachers are highly skilled educators. They should

1. have mentoring experience and/or supervisory experience,

2. be professionally active beyond the classroom,

3. be an experienced teacher – with tenure or masters degree preferred,

4. be NYS Certified, and

5. be recommended by the school district.

Chapter 4

Online Forms

- Student Teacher Observation Report:

  `https://sites.google.com/site/andrewfdouglas/student_teaching_eval_ 8_ 21_14.doc`

- Video Permission Recording Form

  `https://sites.google.com/site/andrewfdouglas/consent_form_revised35.pdf`

- Student Field Placement Record Form

  `https://sites.google.com/site/andrewfdouglas/sign_in_fall_2015.pdf`

- Student Curriculum Advisement Form

  `https://sites.google.com/site/andrewfdouglas/advisement_math_ed_11_10_13.docx`

- Sample Lesson Plan for edTPA (consistent with CCSS for Mathematics,
  and the Danielson Framework for Teaching)

  `https://sites.google.com/site/andrewfdouglas/math_ed_lesson_plan_douglas_9_10_14.docx`

- Field Placement Request Form

  `https://sites.google.com/site/andrewfdouglas/student_teaching_application.pdf`

- The Danielson Framework for Teaching

  `https://sites.google.com/site/andrewfdouglas/2013_FfTEvalInstrument_Web_r20140613.pdf`

- Common Core State Standards for Mathematics

  `http://www.p12.nysed.gov/ciai/common_core_standards/pdfdocs/nysp12cclsmath.pdf`