Middle, Secondary and Mathematics Education

Middle, Secondary and Mathematics Education
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Mission
The mission of the James Madison University professional education unit is to prepare caring, knowledgeable, skilled and reflective educators who believe that all students can learn and succeed. Our candidates and faculty are committed to lifelong learning and aspire to meet educational needs in a changing, pluralistic and democratic society. The personal and professional development of candidates is accomplished by emphasizing excellence and continuous innovation in quality undergraduate, graduate and professional programs.

James Madison University's College of Education is distinguished through faculty and candidate achievements, academic rigor, excellence in teaching, candidate and faculty interactions and relationships, technological innovations, and national recognitions. The college maintains relevance through active and growing interactions with other colleges within the university and with local, state, regional, national and international communities.

The college is committed to providing:
- graduate programs that emphasize advanced knowledge in a specialty area and the development of effective leadership and professional skills for addressing the needs of a changing society.
- continuing professional development and service programs in cooperation with public and private schools and agencies, other colleges, institutions, and businesses.
- The undergraduate and graduate teacher education programs are accredited by the National Council for Accreditation of Teacher Education and approved by the Virginia State Board of Education.
The basic philosophy of the college is reflected in the following goals:

- To educate men and women for the multiple professions included in the college at both the undergraduate and graduate levels, not merely by developing skills and knowledge but by stimulating creativity, developing cognitive abilities, and encouraging the testing of hypotheses and reinterpretation of the human experience.
- To encourage a balanced faculty orientation toward teaching, research, scholarship, community service and professionalism that recognizes individual strengths and preferences of the college’s faculty.
- To create an environment that fosters an atmosphere of open communication among candidates, faculty members and community.
- To anticipate societal needs and provide necessary resources for implementing effective on- and off-campus programs now and in the future.

Programs of Study

Middle, Secondary and Mathematics Education offers the following programs:

- Master of Arts in Teaching (M.A.T) with a concentration in middle school education, a fifth-year continuation initial licensure program.
- The Master of Education (M.Ed.) in Education with a concentration in middle school education, an advanced program designed for candidates who already possess a teaching license. The M.Ed. program in middle education is not accepting new students at this time.
- Master of Arts in Teaching (M.A.T) with a concentration in secondary education, designed to allow candidates to meet requirements for a license to teach students of grades 6-12 in the public schools of Virginia.
- Master of Education (M.Ed.) in Education with a concentration in secondary education, designed to provide advanced preparation for teachers and other school personnel already eligible for or holding initial teaching licenses. The M.Ed. program in secondary education is not currently accepting new students.
- The Master of Education (M.Ed.) in Education with a concentration in K-8 mathematics specialization. This program is offered in conjunction with the Department of Mathematics and Statistics.

Middle School Education

M.A.T. with a concentration in Middle School Education (6-8)

Admission Criteria

To be fully admitted to the M.A.T. degree program, candidates must have:

- Satisfied all requirements for admission to teacher education.
- Submitted passing Praxis II scores in two content areas to the JMU Education Support Center prior to beginning more than 12 hours of MAT graduate course work; submitted passing Praxis II scores for at least one content area to the JMU Education Support Center prior to beginning more than 6 hours of MAT graduate course work.
- Exhibited and demonstrated personal qualities and dispositions that reflect effective development as a professional educator.
- Satisfied all requirements for admission to The Graduate School, including:
  - completion of a baccalaureate degree in IDLS from JMU or the equivalent
  - an undergraduate cumulative GPA of 2.7 or higher (on a 4.0 scale)
passed all gateway products in the Middle Education undergraduate minor
- taken the Graduate Record Examination and scored at the 25th percentile or above.

Exception: Candidates completing their undergraduate degree and the appropriate teacher education pre-professional programs (majors and minors) at JMU are not required to take the Graduate Record Exam.

All candidates in the middle school education M.A.T. program must have an undergraduate major or the equivalent in interdisciplinary liberal studies (IDLS) from JMU. The IDLS program, with its expanded approach to the general education core, and its dual concentrations in English, social sciences, the natural sciences or mathematics, meets the licensure requirements for a two-subject endorsement for teachers licensed in middle school education.

**Program Mission and Outcomes**

The mission of the M.A.T. program in middle school education is to prepare highly qualified professionals for educational roles in middle schools through advanced course work and field experiences.

These school professionals will:
- design and deliver curricula that effectively impact student learning;
- integrate technology in learning settings;
- value diversity of faculty and students in the school;
- collaborate with colleagues, parents and others;
- be reflective practitioners who continually evaluate their actions; and
- value lifelong learning, engage in professional development and conduct educational research.

The Master of Arts in Teaching in middle school education is designed to lead to initial teacher licensure with endorsements in two content areas. The fifth-year format forms the last phase of the five-year teacher licensure programs. This format is designed to serve candidates who have completed the appropriate prerequisite requirements in an undergraduate education program at JMU. Candidates should check with their adviser frequently to be apprised of changes in the offerings and requirements listed that may affect them.

**Degree Requirements**

As an undergraduate, the candidate must first complete 36 credit hours of middle education pre-professional coursework along with the IDLS major. Then the candidate must apply and be admitted to the graduate school for the 6-8 M.A.T. Finally, the candidate must complete the 32 hours of graduate coursework which includes student teaching and a final research project.

**Master of Arts in Teaching with a Concentration in Middle School Education (6-8)**

<table>
<thead>
<tr>
<th>Degree Requirements</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Second Year</strong></td>
<td></td>
</tr>
<tr>
<td>GPSYC 160. Life Span Human Development</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 300. Foundations of American Education</td>
<td>3</td>
</tr>
<tr>
<td><strong>Third Year</strong></td>
<td></td>
</tr>
<tr>
<td>EDUC 310. Teaching in a Diverse Society</td>
<td>3</td>
</tr>
<tr>
<td>MIED 311. Field Experience in Middle Education</td>
<td>2</td>
</tr>
<tr>
<td>READ 312. Reading and Writing across the Curriculum in the Middle Grades</td>
<td>3</td>
</tr>
<tr>
<td>(EDUC 310, MIED 311, and READ 312 are corequisites for middle education pre-</td>
<td></td>
</tr>
<tr>
<td>professional students)</td>
<td></td>
</tr>
</tbody>
</table>
MSSE 370. General Instructional Methods for Grades 6-12  3
MSSE 371. Clinical Experience in Adolescent Education  1
(MSSE 370 and MSSE 371 are corequisites for middle education pre-professional students)

Fourth Year
Students complete two of the courses below (3 credits each):  6
MSSE 470E. Methods in English/Language Arts for the Middle School
MSSE 470H. Methods in Social Studies for the Middle School
MSSE 470S. Methods in Science for the Middle School
MSSE 470M. Methods in Mathematics for the Middle School
MSSE 471. Field Experience in Middle Education  6
Students complete this course twice in appropriate content areas (3 credits each)
READ 472. Literacy, Assessment, and Instruction in Content Areas for the Middle Grades  3
EXED 460. Differentiation of Instruction  3

Graduate Course Requirements  Credit Hours
First Stage, Usually Summer Undergraduate Year
EDUC 540. Educational Technology  3
EXED 512. Behavior Management in the Classroom  3
MSSE 630. Inquiry in the Classroom  3
MIED 620. Assessment in Middle Education  3
Second Stage, Fall Semester of MAT Year
MSSE 650. Internship Seminar  3
MSSE 690. Internship in Middle and Secondary Education  8
Last Stage, Last Semester of MAT Program
MIED 610. Collaborative Leadership in School  3
MIED 656. Seminar in Middle Education  3
Approved Graduate Level Elective  3

The Post-Baccalaureate Entry Option
This program is for candidates who hold a bachelor's and/or master's degree in an appropriate academic content area and wish to be licensed to teach in that area.
Additional Admission Criteria

Candidates admitted to this program of study are expected to have completed an arts and sciences undergraduate major from an accredited college or university with a 2.7 grade-point average or above (on a 4.0 scale). Candidates are required to provide transcript evidence that they have completed liberal studies and specialty area courses comparable in content and total hours to those expected of an undergraduate major. Candidates in the middle education program must have the requisite content coursework in two areas (mathematics, sciences, language arts, social science). Those applicants not having such course work will be required to complete any specifically required undergraduate-level general education and/or subject matter content courses under terms of provisional admission to graduate study as a degree-seeking candidate.

Candidates must also apply for and be admitted to teacher education at JMU. Candidates must initiate their application by contacting the JMU Education Support Center. Criteria for admission are described in the Undergraduate Catalog.

Candidates must also take the GREs and meet all requirements of admission to graduate school. Candidates must also submit passing Praxis II scores to the Education Support Center prior to enrolling in MAT graduate course work.

M.Ed. with a Concentration in Middle School Education (4-8)

The M.Ed. program in middle education is not accepting students at this time.

Admission Criteria

All criteria are considered when reviewing the candidates for admission to this Master of Education degree program. No one criterion will be the sole reason for lack of admission to the program. Criteria include:

- GRE scores at the 25th percentile or higher for both verbal and quantitative sections.
- Undergraduate grade point average of 2.75 or higher.
- Baccalaureate degree from a regionally accredited college/university.
- Professional resume.
- A valid teaching license.

A two- to three-page written statement (double spaced) describing the applicant's professional background, the educational issues that the applicant would like to address in the master's program and the applicant's long-term professional goals.

An interview with one or more faculty in middle education to ensure the applicant understands the particular perspectives, goals and requirements of the middle education concentration.

The Master of Education degree with a concentration in middle education is designed as advanced preparation for teachers working with fourth- through eighth-grade students. All applicants must have an initial teacher's license. This program helps candidates create an intellectual framework as the basis for implementing new curricular programs as well as evaluating current curricular programs in middle education. Through examination and analysis of current theory and research, as well as completing school-based research projects, candidates become equipped to better manage educational changes, actively collaborate with professional peers and perform in a manner based on current research and standards of expert professional practice.
Program Mission and Outcomes

The mission of the Master of Education degree with a middle education concentration is to prepare master teachers for roles in grades 4-8 school settings. These school professionals will possess the knowledge, skills and dispositions to:

- design and deliver curricula for diverse learners;
- create and maintain learning climates;
- use assessment strategies;
- be reflective practitioners who continually evaluate their actions;
- collaborate with colleagues, parents and others;
- engage in professional development; and
- perform field-based research.

Master of Education with a Concentration in Middle School Education (4-8)

<table>
<thead>
<tr>
<th>Degree Requirements</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUC 620. Changing Contexts of American Schools</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 630. Inquiry in Education</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 631. Seminar in Educational Inquiry ¹</td>
<td>1</td>
</tr>
<tr>
<td>EDUC 640. Teaching, Learning and Curriculum</td>
<td>5</td>
</tr>
<tr>
<td>MIED 610. Collaborative Leadership in Schools</td>
<td>3</td>
</tr>
<tr>
<td>MIED 620. Assessment in Middle Education</td>
<td>3</td>
</tr>
<tr>
<td>MIED 656. Seminar in Middle Education</td>
<td>3</td>
</tr>
<tr>
<td>Approved electives ¹</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>

¹ Courses included as electives must be selected to develop the professional needs and interests of the candidate. Electives must be approved by the major adviser and selected from the graduate offerings of the university.

This program is designed to engage candidates in a sequence of courses that build upon theoretical bases in the areas of cognition, learning, development, teaching, assessment, collaboration and leadership. For the final project, consistent with prevailing literature and inquiry methods, the candidate conducts and presents the results of a field based research project directed toward a specific school-related issue.
Secondary Education

M.A.T. with a Concentration in Secondary Education

Admission Criteria

To be fully admitted to the secondary education M.A.T. degree program, candidates must have:

- Satisfied all requirements for admission to teacher education.
- Submitted passing Praxis II scores to the JMU Education Support Center prior to beginning more than 12 hours of MAT graduate course work.
- Exhibited and demonstrated personal qualities and dispositions that reflect effective development as a professional educator.
- Satisfied all requirements for admission to The Graduate School, including:
  - completed requirements for a baccalaureate degree from an accredited college/university,
  - achieved an undergraduate cumulative GPA of 2.7 or higher (on a 4.0 scale), and
  - taken the Graduate Record Examination and scored at the 25th percentile or above.

Exception: Candidates completing their undergraduate degree and the appropriate teacher education pre-professional programs (majors and minors) at JMU are not required to take the Graduate Record Exam.

Program Mission and Outcomes

The mission of the secondary education programs is to prepare teachers who are reflective decision makers. Teachers who are reflective decision makers are able to choose from among known educational alternatives to maximize student learning in a variety of instructional situations.

These school professionals will:

- design and deliver curricula that effectively impact student learning;
- integrate technology in learning settings;
- value diversity of faculty and students in the school;
- collaborate with colleagues, parents and others;
- be reflective practitioners who continually evaluate their actions; and
- value lifelong learning and engage in professional development.

Master of Arts in Teaching with a concentration in Secondary Education, 5th Year Format (Grades 6-12)

This program is intended for JMU candidates continuing from the undergraduate pre-professional secondary education program. The secondary education Master of Arts in Teaching degree is designed to enable candidates to develop a strong professional education on a foundation of undergraduate preparation in General Education, an appropriate major and introductory professional education experiences.

Program Mission

The secondary education Master of Arts in Teaching degree emphasizes the preparation of effective and reflective teachers who are knowledgeable in the content they are preparing to teach and cognizant of the characteristics of adolescents, ages 12-18. The licensure areas for which individuals are prepared include English, foreign language (PreK-12), mathematics, natural sciences (biology, chemistry, earth and space
science, physics), and history and social sciences (includes licensure to teach history, economics, geography and political science).

Undergraduate candidates and post-baccalaureate candidates planning to teach at the secondary level (grades 6-12) should consult with a secondary education adviser to ensure completion of the required prerequisites. Candidates should come to the departmental office in 3200 Memorial Hall to be assigned a secondary education adviser. A specific arts and sciences major or equivalent course work and experiences may be required for admission to some programs of the M.A.T. and for licensure to teach in certain disciplines and grade levels. Candidates should check with their adviser frequently to be apprised of changes in the offerings and requirements listed that may affect them.

The fifth-year licensure programs build on the extensive foundational course work and experiences candidates have completed in their undergraduate programs. Candidates will have completed the prescribed course work to develop the knowledge, skills, attitudes and behaviors needed for successful completion of the M.A.T.

Candidates interested in the requirements for the M.A.T. program in physical and health education (PreK-12) should refer to the description for that program in the Department of Kinesiology.

The secondary education Master of Arts in Teaching prepares individuals for initial licensure to teach students of grades 6 through 12, in all the fields listed below except foreign language. Foreign language licensure is grades PreK-12.

**Degree Requirements**

Although individual candidate's programs of study will vary depending upon major and licensure area, the following represents the breakdown of the required credits in a typical program of study.

The program of study for secondary education is as follows.

**UndergraduateRequirements**

Undergraduate candidates in the secondary education pre-professional program must complete an arts and sciences major or the equivalent in a specific discipline related to the teacher licensure area of intent. Majors related to approved licensure areas at JMU include biology, chemistry, English, foreign languages, geology, history or political science, mathematics and physics. Candidates with majors in history or political science must also complete course work in the interdisciplinary social science minor. Students must earn grades of "C-" or better in all academic major content courses and secondary education pre-professional course work.

**Secondary Education Master of Arts in Teaching Undergraduate Program of Study**

<table>
<thead>
<tr>
<th>Undergraduate Prerequisites</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education</td>
<td>41-44</td>
</tr>
<tr>
<td>Major field of study</td>
<td>36-60</td>
</tr>
<tr>
<td>Undergraduate pre-professional studies</td>
<td>22-24</td>
</tr>
</tbody>
</table>

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Minimum requirement is 120 credit hours.
Secondary Education Master of Arts in Teaching Degree Requirements

Undergraduate Prerequisites – Second Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPSYC 160. Life Span Human Development</td>
<td>3</td>
</tr>
<tr>
<td>MSSE 101. Introduction to the Profession (optional)</td>
<td>2</td>
</tr>
<tr>
<td>EDUC 300. Foundations of American Education</td>
<td>3</td>
</tr>
</tbody>
</table>

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Undergraduate Prerequisites – Third and Fourth Years

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUC 310. Teaching in a Diverse Society</td>
<td>3</td>
</tr>
<tr>
<td>MSSE 370. General Instructional Methods for Grades 6-12</td>
<td>3</td>
</tr>
<tr>
<td>MSSE 371. Clinical Experience in Adolescent Education</td>
<td>1</td>
</tr>
<tr>
<td>(EDUC 310, MSSE 370, and MSSE 371 are corequisites)</td>
<td></td>
</tr>
<tr>
<td>MSSE 470. Content Methods for the Middle School</td>
<td>3</td>
</tr>
<tr>
<td>MSSE 471. Field Experience in the Middle School</td>
<td>3</td>
</tr>
<tr>
<td>READ 440. Literacy-Based Learning in Secondary Education</td>
<td>3</td>
</tr>
<tr>
<td>(MSSE 470, MSSE 471 and READ 440 are corequisites)</td>
<td></td>
</tr>
</tbody>
</table>

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Graduate Course Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUC 540. Educational Technology</td>
<td>3</td>
</tr>
<tr>
<td>EXED 512. Behavior Management in the Classroom</td>
<td>3</td>
</tr>
<tr>
<td>EXED 520. Differentiation of Instruction and Academic Collaboration</td>
<td>3</td>
</tr>
<tr>
<td>MSSE 570. Content Methods Course for High School</td>
<td>3</td>
</tr>
<tr>
<td>MSSE 571. Content Area Field Experience in High School</td>
<td>3</td>
</tr>
<tr>
<td>(MSSE 570 and MSSE 571 are corequisites)</td>
<td></td>
</tr>
<tr>
<td>MSSE 607. Middle and Secondary School Curriculum and Co-curriculum</td>
<td>3</td>
</tr>
<tr>
<td>MSSE 625. Assessment in Secondary Education</td>
<td>3</td>
</tr>
<tr>
<td>MSSE 630. Inquiry in the Classroom</td>
<td>3</td>
</tr>
<tr>
<td>MSSE 650. Internship Seminar</td>
<td>3</td>
</tr>
<tr>
<td>MSSE 675. Internship in Middle and Secondary Education</td>
<td>8</td>
</tr>
<tr>
<td>(MSSE 650 and MSSE 675 are corequisites)</td>
<td></td>
</tr>
</tbody>
</table>

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1 Candidates pursuing a Foreign Language teaching license take EDUC 675M and EDUC 675S, Internship in Foreign Language.

The Post-Baccalaureate Entry Option

This program is for candidates who hold a bachelor's and/or master's degree in an appropriate academic content area and wish to be licensed to teach in that area.
Additional Admission Criteria

Candidates admitted to this program of study are expected to have completed an arts and sciences undergraduate major from an accredited college or university with a 2.7 grade-point average or above (on a 4.0 scale). Candidates are required to provide transcript evidence that they have completed liberal studies and specialty area courses comparable in content and total hours to those expected of an undergraduate major. Those applicants not having such course work will be required to complete any specifically required undergraduate-level general education and/or subject matter content courses under terms of provisional admission to graduate study as a degree-seeking candidate.

Candidates must also apply for and be admitted to teacher education at JMU. Candidates must initiate their application by contacting the Education Support Center. Criteria for admission are described in the undergraduate catalog, available online at http://www.jmu.edu/catalog/. Candidates must also take the GREs and meet all requirements of admission to graduate school. Candidates must also submit passing Praxis II scores to the Education Support Center prior to enrolling in MAT graduate course work.

M.Ed. in Education with a Concentration in Secondary Education (6-12)

This program is for candidates who hold a bachelor's degree in an approved academic subject area, are licensed to teach and wish to pursue advanced study in secondary education. This is not a licensure program. Candidates must already hold or meet eligibility requirements for a teacher license to pursue this degree.

_The M.Ed. program in secondary education is not accepting new students at this time._

Mathematics Education

M.Ed. with a concentration in K-8 Mathematics Specialization

The K-8 mathematics specialist concentration at James Madison University leads to a Masters of Education (M.Ed.) with a concentration in K-8 Mathematics Specialization and allows candidates to meet the competencies required for the K-8 Mathematics Specialists endorsement through the Virginia Department of Education. The program consists of 36 hours: 15 hours of course work in mathematics, 15 hours of course work in mathematics education and 6 hours of an externship.

The Mathematics Specialist concentration at James Madison University is a cohort program. We will accept 25 students into the program. Those interested in applying should complete the graduate admission application provided by The Graduate School: www.applyweb.com/apply/jmug. This program is offered jointly by the Department of Mathematics and Statistics and the Department of Middle, Secondary and Mathematics Education.

Admission Criteria

All criteria are considered when reviewing the candidates for admission to this Master of Education degree program. Criteria include:

- Satisfaction of all requirements for admission to The Graduate School
- A minimum of three years of classroom teaching experience where mathematics instruction was a responsibility.
- Completion of a minimum of six hours of mathematics courses (graduate and/or undergraduate).
- Completion of the Praxis II for Middle School Math (code 0069; register at http://www.ets.org).
- Two letters of recommendation.
- A two- to three-page personal statement indicating the reasons for enrolling in the concentration.
- Applicants may also be asked to complete an interview with the mathematics education faculty.

Degree Requirements

<table>
<thead>
<tr>
<th>Course Requirements</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 502. Number and Operations for K-8</td>
<td>3</td>
</tr>
<tr>
<td>MATH 503. Algebra and Functions for K-8</td>
<td>3</td>
</tr>
<tr>
<td>MATH 504. Rational Numbers for K-8</td>
<td>3</td>
</tr>
<tr>
<td>MATH 505. Probability and Statistics for K-8</td>
<td>3</td>
</tr>
<tr>
<td>MATH 506. Geometry for K-8</td>
<td>3</td>
</tr>
<tr>
<td>MAED 626. Advanced Mathematics Instruction for K-8</td>
<td>3</td>
</tr>
<tr>
<td>MAED 627. Assessment of Learners (Leadership I)</td>
<td>3</td>
</tr>
<tr>
<td>MAED 628. Diverse Learners in the Mathematics Classroom</td>
<td>3</td>
</tr>
<tr>
<td>MAED 629. Professional Development of Adult Learners (Leadership II)</td>
<td>3</td>
</tr>
<tr>
<td>MAED 630. Research in Mathematics Education (Leadership III)</td>
<td>3</td>
</tr>
<tr>
<td>MAED 631. Externship in Education I</td>
<td>3</td>
</tr>
<tr>
<td>MAED 632. Externship in Education II</td>
<td>3</td>
</tr>
</tbody>
</table>

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Master of Education in Mathematics Degree

For information on the Master of Education in mathematics, see Mathematics.

Graduation

All requirements for the degree must be completed by the course work completion deadline in the semester in which the degree is conferred to receive a diploma dated the day of graduation. Applications for graduation should be completed early in the term in which the candidate plans to graduate. Candidates who will satisfy all degree requirements in the summer may participate in the spring commencement ceremony if they have completed an Application for Graduation form signed by their adviser and program coordinator, and they must be pre-registered for summer classes prior to the May commencement ceremony. Candidates must be enrolled during the semester in which the degree is to be conferred. It should be noted that applicants actually graduate and receive their degrees only when all requirements are satisfied. Candidates who do not satisfy all requirements for graduation will be notified of deficiencies and must re-apply for a later graduation date.
Course Offerings

Mathematics Education

MAED 501. Special Topics in Mathematics Education.
1-3 credits.
Designed to allow students to explore selected topics in mathematics education.

MAED 600. Seminar in Mathematics Education.
3 credits.
This survey course is designed to familiarize teachers with current research topics related to mathematics teaching and learning. Research topics include teacher professional development, mathematical reasoning (e.g., algebraic, geometric, multiplicative, proportional, arithmetical); implementation of standards-based curriculum, assessment of student learning, the role of representations, teaching for problem solving and theories that frame research.

3 credits.
This course offers opportunities for teachers to explore curricular goals and implementations for various mathematical topics addressed in middle and secondary mathematics classrooms. Teachers will consider different curricula and how those curricula might be implemented to effectively support student learning. Mathematics topics addressed include algebra, proportional reasoning, geometry and advanced mathematics.

MAED 620. Teaching Mathematics with Technology.
3 credits.
This course offers opportunities for teachers to explore research-based applications of technology tools in secondary and middle school mathematics. Teachers will engage in advanced use of various technology tools for learning and teaching mathematics, including designing technology environments, appropriate investigation tasks, and professional developmental activities.

3 credits.
This course will prepare teachers to engage in student-centered mathematics instruction in grades K-8. Instruction will focus on number and operations, algebra, geometry, measurement, data analysis, and probability. The Principles and Standards for School Mathematics will provide foundational ideas for the topics in the course, including the use of the five process standards and the use of technology in the teaching and learning of mathematics. Prerequisites: MATH 502.

MAED 627. Assessment of Learners (Leadership I).
3 credits.
This course is designed to help teachers create, implement, and evaluate both formal and informal assessment techniques. Teachers will construct instruments ranging from formative learning checks to summative tests and projects and the corresponding rubrics for evaluation purposes. Teachers will also learn to analyze assessment results in order to gauge student understanding and knowledge, and to use this information to modify instruction accordingly. Prerequisites: MATH 502 and MAED 626.

MAED 628. Diverse Learners in The Mathematics Classroom.
3 credits.
This course is designed to help teachers understand the learning characteristics of struggling and diverse learners in mathematics classrooms and to use the research-based instructional strategies which target these learning characteristics. The focus of the course will be learning to work effectively with students with learning disabilities in mathematics as well as English language learners. Prerequisites: MATH 502, MATH 503, MAED 626 and MAED 627.
MAED 629. Professional Development of Adult Learners (Leadership II).
3 credits.
This course is designed to help teachers build those skills, understandings and dispositions required to play optimal mathematics education leadership roles in elementary/middle schools. In particular, this course will help mathematics specialists create, implement, and evaluate a variety of professional development experiences for classroom teachers. Prerequisites: MATH 502, MATH 503, MATH 504, MATH 505, MAED 626, MAED 627, and MAED 628.

MAED 630. Research in Mathematics Education (Leadership III).
3 credits.
This course is designed to familiarize teachers with the body of research related to selected topics in mathematics education and will help teachers further their understanding of the relationships between research and practice. Teachers will use this course to begin to develop ideas for a final project for the program. Prerequisites: MATH 502, MATH 503, MATH 504, MATH 505, MAED 626, MAED 627, MAED 628, and MAED 629.

MAED 631. Externship in Education I.
3 credits.
This course is designed to support teachers in developing a final project for the mathematics specialists program. Projects should be developed in conjunction with the teacher's school or school division and should help prepare teachers for the role of a mathematics specialists in an elementary/middle school setting. Prerequisites: MATH 502, MATH 503, MATH 504, MATH 505, MAED 626, MAED 627, MAED 628, MAED 629, and MAED 630.

MAED 632. Externship in Education II.
3 credits.
This course is designed to support teachers in implementing a final project in conjunction with their schools or school divisions which will help prepare them for the role of a mathematics specialists in an elementary/middle school setting. Prerequisites: MATH 502, MATH 503, MATH 504, MATH 505, MAED 626, MAED 627, MAED 628, MAED 629, MAED 630, and MAED 631.

Mathematics

3 credits.
This course will explore topics important to the mathematical experiences of students in K-8 classrooms including addition, subtraction, multiplication, division, place value, and properties of whole numbers. Relevant connections to the history of mathematics will also be included.

MATH 503. Algebra and Functions for K-8.
3 credits.
The course is designed to develop an understanding of topics from algebra: variables, patterns, and functions; modeling and interpreting graphs; linear and non-linear functions, connecting these ideas to underlying concepts in primary and middle grades mathematics. Attention will be given to interpreting and assessing students' work and learning. Relevant connections to the history of mathematics will also be included. Prerequisites: MATH 502, MAED 626, MAED 627.

3 credits.
This course is designed to help participants develop understanding in: theoretical development of math and students' learning of math within content strands of rational numbers and proportional reasoning; development of pedagogical knowledge of rational numbers and proportional reasoning appropriate for K-8 Mathematics Teacher Specialists; and assessment of K-8 students' mathematical conceptions through
interviews. Relevant connections to the history of mathematics will also be included. Prerequisites: MATH 502, MATH 503, MAED 626, MAED 627, MAED 628, MAED 629.

3 credits.
The course will develop students' understanding of probabilistic structures, reasoning, data analysis and exploration. These structures will be related to real world problem solving. Attention will also be given to children's thinking, how they learn this basic mathematics, their problem solving strategies, and how they construct their understanding of our number system and arithmetic. Relevant connections to the history of mathematics will also be included. Prerequisites: MATH 502, MATH 503, MATH 504, MAED 626, MAED 627, MAED 628, MAED 629.

3 credits.
Explorations of foundations of informal measurement and geometry in one, two, and three dimensions. The van Hiele model for geometric learning is used as a framework for how children understand measurement and geometric relationships. Visualization, spatial reasoning, and geometric modeling are stressed. Transformational geometry, congruence, similarity, and geometric constructions will be discussed and relevant connections to history of mathematics will be included. Prerequisites: MATH 502, MATH 503, MATH 504, MAED 626, MAED 627, MAED 628, MAED 629, MAED 630 and MAED 631.

MATH 510. Analysis for Teachers.
3 credits.
A course to update and broaden secondary teachers' capability and point-of-view with respect to topics in analysis. Applications of concepts such as limits, continuity, differentiation and integration. May be taken for graduate credit and for certificate renewal by secondary school teachers. Prerequisite: Undergraduate analysis or permission of instructor.

MATH 512. Discrete Mathematics for Teachers.
3 credits.
A course to update and broaden secondary teachers' capability and point-of-view with respect to topics in discrete mathematics. May be taken for graduate credit for certificate renewal by secondary school teachers. Prerequisite: Undergraduate mathematics through linear algebra.

MATH 514. Algebra for Teachers.
3 credits.
From an advanced viewpoint, an investigation of topics in algebra from high school curriculum. Theory of equations, polynomial rings, rational functions and elementary number theory. Course may be taken for graduate credit and for certificate renewal by secondary school teachers. Prerequisite: Undergraduate algebra or permission of instructor.

MATH 520. Geometry for Teachers.
3 credits.
Topics in geometry of concern to secondary teachers in their work and provision for background and enrichment. Various approaches to study of geometry, including vector geometry, transformational geometry and axiomatics. Course may be taken for graduate credit and for certificate renewal by secondary school teachers. Prerequisite: Undergraduate mathematics through linear algebra or undergraduate geometry.

MATH 615. History of Mathematics.
3 credits.
Topics in the history of mathematics of particular concern to secondary teachers in their work and provision for background and enrichment. Selected topics spanning ancient times to the present. Course may be taken for graduate credit and for certificate renewal by secondary teachers.

MATH 618. Probability and Statistics for Teachers II.
3 credits.
A course to update and broaden secondary teacher's capability and point-of-view with respect to selected topics in statistics and to prepare teachers to teach AP statistics. Course may be taken for graduate credit and for certificate renewal by secondary school teachers. Prerequisite: MATH 517.

**MATH 685. Selected Topics II.**
3 credits.
An in-depth study of selected topics not otherwise covered in the regular offerings of the department. May be repeated for credit when course content changes.

### Middle Education

**MIED 501. Workshop in Middle Education.**
1-3 credits.
Designed to provide students with workshop experiences related to current needs evident in middle education. The topics considered will be determined by interest and demand. No more than six credit hours earned in workshops in education can be applied to a major program.

**MIED 530. Teaching Mathematics in the Elementary and Middle Grades.**
3 credits.
Individual and group study of content, methodology and instructional materials necessary to the design and implementation of instructional programs in modern mathematics. Attention is given to differentiation of instruction in terms of learning ability.

**MIED 610. Collaborative Leadership in Schools.**
3 credits.
Designed to provide students with research, theories and practices regarding teacher leadership and collaboration in school contexts and methods for addressing school-based improvement efforts and processes. Specific attention is given to collaboration and leadership toward community involvement and communication in middle schools.

**MIED 620. Assessment in Middle Education.**
3 credits.
The course is designed to help teacher education candidates develop competencies for designing and utilizing effective assessment strategies for determining student performance and progress in a variety of instructional situations and for making a range of instructional decisions, including how to integrate the curriculum to best serve middle school students' needs. Prerequisites: MSSE 370, and admission to the M.A.T. program in Middle Education.

**MIED 656. Seminar in Middle Education.**
3 credits.
An intensive study of selected problems in middle education. Research findings are reviewed and educational theory is explored.

**MIED 680. Reading and Research.**
3 credits.
Directed reading and research in areas of student interest. Reading and research may be done only in the major field of study. A plan for study must be submitted in prescribed form and approved prior to registration for the course. Prerequisites: Written permission of adviser and program coordinator.

### Middle and Secondary Education

**MSSE 570 (E, H, M, or S) Content Methods Course for High School.**
3 credits.
Research findings about teaching in the content area will be used to identify the most effective instructional strategies for teaching that content to students in grades 9-12. Emphasis will be on
developing plans for employing the strategies and making appropriate instructional decisions based on instructional goals, the learner and available resources. Prerequisites: MSSE 470, MSSE 471, READ 440, admission to teacher education, and admission to the M.A.T. program. Corequisite: MSSE 571.

E. English Teaching Methods, Grades 9-12.
3 credits.

H. Social Studies Teaching Methods, Grades 9-12.
3 credits.

M. Mathematics Teaching Methods, Grades 9-12.
3 credits.

S. Natural Sciences Teaching Methods, Grades 9-12.
3 credits.

MSSE 570F. Methods of Language Teaching.
3 credits.
Research findings about language teaching will be used to identify the most effective instructional strategies for teaching languages to students in grades preK-12. Emphasis will be on developing plans for employing the strategies and making appropriate instructional decisions based on instructional goals, the learner, and available resources. Prerequisites: MSSE 370, admission to Teacher Education and admission to the M.A.T. program for Fifth year M.A.T. foreign language students; ESL minors should have completed EDUC 422, EDUC 425 and EDUC 428. Corequisite: MSSE 571F for Fifth year M.A.T. foreign language students.

MSSE 571 (E, H, M, S). Content Area Field Experience in High School.
3 credits.
Provides practical classroom experience for teacher education candidates in the secondary education programs under the supervision of an in-service teacher and a clinical professor. Students engage in classroom activities that provide an opportunity for them to practice the strategies and concepts learned in the methods courses. Prerequisites: MSSE 470, MSSE 471, READ 440.

E. Field experience in High School English, Practicum III.
3 credits.

H. Field Experience in High School Social Studies, Practicum III.
3 credits.

M. Field Experience in High School Mathematics, Practicum III.
3 credits.

S. Field Experience in High School Natural Science, Practicum III.
3 credits.

MSSE 571F. Field Experience in Foreign Language, Practicum III.
3 credits.
Provides practical classroom experience in elementary, middle and high school settings to middle and secondary foreign language students under the supervision of an in-service teacher and a clinical professor. Students engage in classroom activities that provide an opportunity for them to practice the strategies and concepts learned in the methods courses.

MSSE 607. Middle and Secondary Curriculum and Co-Curriculum.
3 credits.
The course is designed to help prospective teachers develop the knowledge, skills and dispositions necessary for their role in curriculum development and delivery in a diverse school and classroom environment. Prerequisites: MSSE 370, admission to teacher education, and admission to the M.A.T. program.
MSSE 625. Assessment in Secondary Education.
3 credits.
This course is designed to prepare prospective teachers to create and evaluate both formal and informal assessment strategies. Candidates will construct instruments ranging from formative learning checks to summative tests and projects/rubrics. Candidates will also learn to analyze assessment results in order to gauge student progress and adjust instruction appropriately. Prerequisites: MSSE 370, Admission to Teacher Education and the M.A.T. program.

MSSE 630. Inquiry in the Classroom.
3 credits.
Skills, methods, insights and understandings which will enable the beginning teacher to become an intelligent and critical consumer of educational inquiry and a productive participant in the process of classroom-based inquiry. Prerequisites: Admission to teacher education and the M.A.T. program.

MSSE 631. Inquiry Seminar.
1 credit.
The course is designed to provide technical support and feedback for prospective teachers to successfully complete a classroom based inquiry project during their student teaching experience. Students will be graded on an S/U basis. Prerequisites: MSSE 630, admission to the M.A.T. program, and admission to student teaching.

MSSE 650. Internship Seminar.
3 credits.
A seminar designed to promote reflective decision making among teacher candidates during their internship experience. During seminar sessions teacher candidates will engage in case analysis and Teacher Work Sample development. Corequisite: MSSE 690 for middle education students or MSSE 675 for secondary education students.

MSSE 675. Internship in Middle and Secondary Education.
4 credits.
Participants will experience the full range of conditions and tasks expected of a teacher for students in grades 6-12. They will be expected to develop and demonstrate competencies in teaching with the supervision and support of experienced teachers. Students must register for two eight-week blocks during the same semester for a total of eight credits. Students will receive a grade of "S" for satisfactory performance or "U" for unsatisfactory performance. Corequisite: MSSE 650.

MSSE 680. Applied Research in Middle and Secondary Education.
3 credits.
Provides students with the resources, skills, and knowledge required to conduct an individualized classroom-based inquiry project as a capstone activity in the M.A. T. program. Prerequisite: MSSE 630.

MSSE 690. Internship in Middle Education.
4 credits.
Participants will experience the full range of conditions and tasks expected of a teacher for students in grades 6-8. They will be expected to develop and demonstrate competencies in teaching with the supervision and support of experienced teachers. Students must register for two eight-week blocks during the same semester for a total of eight credits. Students will receive a grade of "S" for satisfactory performance or "U" for unsatisfactory performance. Intended for middle education minors. Corequisite: MSSE 650.

Secondary Education

3 credits.
The changing face of the American secondary school will be studied and attention will be given to many of
the philosophical, social, cultural, demographic and other factors impacting those changes. Emphasis will be placed on problems, current trends and future perspectives.
Prerequisite: EDUC 620.

3 credits.
Effective teaching techniques and innovative forms of organization and instruction in secondary education will be studied. Emphasis will be on teaching strategies and behaviors and materials selection for serving secondary school students. Prerequisite: An instructional methods course.

SEED 680. Reading and Research.
1-3 credits.
Opportunities for directed reading and research in secondary English, foreign language, mathematics, science and/or social studies. Prerequisites: EDUC 630 or equivalent and written permission of the adviser and program coordinator.