

**Walden University**

# **Catalog**

**2005–2006**

# School of Education

## M.S. in Education

The M.S. in Education program is designed to develop educators serving students in K–12 classrooms as scholar-practitioners or prepare classroom educators to be school principals. The specializations teach advanced skills that are designed to improve student learning. Each specialization area encourages educators to put their new skills to the test in actual classroom and school settings and to continually challenge the results of teaching and learning.

### Specializations

- Curriculum, Instruction, and Assessment (Grades K–12)
- Educational Leadership
- Elementary Reading and Literacy (Grades K–6)
- Elementary Reading and Mathematics (Grades K–6)
- Integrating Technology in the Classroom (Grades 3–12)
- Literacy and Learning in the Content Areas (Grades 6–12)
- Mathematics (Grades K–5)
- Mathematics (Grades 6–8)
- Middle Level Education (Grades 5–8)
- Science (Grades K–8)

The School of Education, in collaboration with Canter & Associates, also provides a series of professional development courses for graduate credit. Such courses are available during each of the three semesters throughout the year. Many of these courses may be substituted for similar courses in master's degree program specializations. A list of courses to be offered for each semester can be requested by calling 800-669-9011.

### Degree Requirements

- 30–36 semester credits (depending on the specialization)
- Core courses
- Specialization courses
- Professional program portfolio, except in the Science (Grades K–8) specialization

### Curriculum

The M.S. in Education program is offered on a semester system. Each specialization has a planned sequence of courses. The program portfolio must be completed during or immediately following the final term of enrollment—except in the Science (Grades K–8) specialization, which does not require a portfolio.

## **Curriculum, Instruction, and Assessment (Grades K–12) Specialization**

The Curriculum, Instruction, and Assessment (Grades K–12) specialization is a 30-semester-credit program based on standards set forth by the U.S. Department of Education, the International Society for Technology in Education (ISTE), the International Reading Association (IRA), and the National Council for Accreditation of Teacher Education (NCATE). The alignment of curriculum, assessment, and instruction is a complex task, but helps to meet this goal: All children can learn. Instituting standards inherently levels the playing field, suggesting the same achievement goals for all students, regardless of socioeconomic conditions, ethnicity, or learning differences. Program content focuses on current thinking about how teachers can best align their curriculum with state and local content standards. In addition, the program helps teachers integrate literacy and technology instruction with teaching content. Each course is eight weeks in length, and there are two consecutive courses per semester. The program is offered in a prescribed sequence for online cohorts of students. A professional program portfolio must be submitted before the degree is granted.

### ***Core Courses (15 sem. cr.)***

EDUC 6610 Teacher as Professional (3 sem. cr.)  
EDUC 6615 Effective Teaching Using Learning Styles and Multiple Intelligences (3 sem. cr.)  
EDUC 6620 Collaborative Action Research (3 sem. cr.)  
EDUC 6625 Habits of Mind: Thinking Skills to Promote Self-Directed Learning (3 sem. cr.)  
EDUC 6635 Classroom Management to Promote Student Learning (3 sem. cr.)

### ***Specialization Courses (15 sem. cr.)***

EDUC 6630 Instructional Models and Strategies (3 sem. cr.)  
EDUC 6671 Designing Curriculum, Instruction, and Assessment, Part I (3 sem. cr.)  
EDUC 6672 Designing Curriculum, Instruction, and Assessment, Part II (3 sem. cr.)  
EDUC 6673 Literacy and Learning in the Information Age (3 sem. cr.)  
EDUC 6674 Designing Curriculum, Instruction, and Assessment for Students With Special Needs (3 sem. cr.)

### ***Course Sequence***

#### **First Semester**

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EDUC 6610 Teacher as Professional  
EDUC 6671 Designing Curriculum, Instruction, and Assessment, Part I

#### **Second Semester**

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EDUC 6615 Effective Teaching Using Learning Styles and Multiple Intelligences  
EDUC 6672 Designing Curriculum, Instruction, and Assessment, Part II

#### **Third Semester**

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EDUC 6625 Habits of Mind: Thinking Skills to Promote Self-Directed Learning  
EDUC 6630 Instructional Models and Strategies

#### **Fourth Semester**

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EDUC 6620 Collaborative Action Research  
EDUC 6673 Literacy and Learning in the Information Age

## **Fifth Semester**

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EDUC 6635 Classroom Management to Promote Student Learning

EDUC 6674 Designing Curriculum, Instruction, and Assessment for Students With Special Needs

The Curriculum, Instruction, and Assessment (Grades K–12) specialization has a semester-based curriculum and, therefore, has a different academic calendar and procedures than the university's quarter-based curricula. For more details, call 888-627-1153 or consult [www.degrees4educators.com](http://www.degrees4educators.com).

## **Educational Leadership Specialization**

The Educational Leadership specialization is a 36-semester-credit program designed for classroom teachers who want to become a school principal. The curriculum reflects the standards for leadership education developed by the Interstate School Leaders Licensure Consortium and the National Policy Board for Educational Administration. This program, grounded in research and evidence of best practices, defines what principals need to know and be able to do, at the most practical level, to enhance learning opportunities and outcomes for all students. Each course is eight weeks in length, and there are two consecutive courses per semester. Internship activities are accomplished throughout the program and in a concluding semester-long Internship course.

### ***Courses (36 sem. cr.)***

EDAD 6800 Facilitating Effective Learning for All Students (3 sem. cr.)

EDAD 6801 Ensuring Quality Education for Students With Diverse Needs (3 sem. cr.)

EDAD 6802 Using Data to Strengthen Schools (3 sem. cr.)

EDAD 6803 Allocating Resources Strategically and Structuring the Organization for Learning (3 sem. cr.)

EDAD 6804 Enhancing Teacher Capacity and Commitment (3 sem. cr.)

EDAD 6805 Facilitating Productive Working Relationships and School Culture to Enhance Student Learning (3 sem. cr.)

EDAD 6806 Collaborating With Families and Communities for Student Success (3 sem. cr.)

EDAD 6807 Creating Positive, Safe, and Effective Learning Environments (3 sem. cr.)

EDAD 6808 Meeting the Literacy Challenge: Leading New Initiatives (3 sem. cr.)

EDAD 6809 Implementing Continuous School Improvement (3 sem. cr.)

EDAD 6810 Internship (6 sem. cr.)

### ***Course Sequence***

#### **First Semester**

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EDAD 6800 Facilitating Effective Learning for All Students

EDAD 6801 Ensuring Quality Education for Students With Diverse Needs

#### **Second Semester**

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EDAD 6802 Using Data to Strengthen Schools

EDAD 6803 Allocating Resources Strategically and Structuring the Organization for Learning

#### **Third Semester**

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EDAD 6804 Enhancing Teacher Capacity and Commitment

EDAD 6805 Facilitating Productive Working Relationships and School Culture to Enhance Student Learning

**Fourth Semester**

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EDAD 6806 Collaborating With Families and Communities for Student Success

EDAD 6807 Creating Positive, Safe, and Effective Learning Environments

**Fifth Semester**

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EDAD 6808 Meeting the Literacy Challenge: Leading New Initiatives

EDAD 6809 Implementing Continuous School Improvement

**Sixth Semester**

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EDAD 6810 Internship

The Educational Leadership specialization is a semester-based curriculum and, therefore, has a different academic calendar and procedures than the university's quarter-based curricula. For more details on this specialization, call 888-627-1153 or consult [www.degrees4educators.com](http://www.degrees4educators.com).

**Elementary Reading and Literacy (Grades K–6) Specialization**

The Elementary Reading and Literacy (Grades K–6) specialization is a 30-semester-credit program based on the International Reading Association standards for the “classroom professional.” This specialization is designed to meet the needs of K–6 classroom teachers who want to improve the reading and literacy skills of their students. Program content focuses on the research and best practices related to the teacher as a professional, effective teaching using learning styles and multiple intelligences, collaborative action research, thinking skills to promote self-directed learning, instructional models and strategies, knowledge and beliefs about reading and literacy, reading instruction and assessment, and organizing and enhancing a classroom literacy program. Each course is eight weeks in length, and there are two consecutive courses per semester. The program is offered in a prescribed sequence in two delivery formats: face-to-face study teams and online cohorts. A professional program portfolio must be submitted before the degree is granted.

***Core Courses (15 sem. cr.)***

EDUC 6610 Teacher as Professional (3 sem. cr.)

EDUC 6615 Effective Teaching Using Learning Styles and Multiple Intelligences (3 sem. cr.)

EDUC 6620 Collaborative Action Research (3 sem. cr.)

EDUC 6625 Habits of Mind: Thinking Skills to Promote Self-Directed Learning (3 sem. cr.)

EDUC 6630 Instructional Models and Strategies (3 sem. cr.)

***Specialization Courses (15 sem. cr.)***

EDUC 6641 Foundations of Reading and Literacy Development (3 sem. cr.)

EDUC 6642 Strategies for Literacy Instruction, Part I (3 sem. cr.)

EDUC 6643 Strategies for Literacy Instruction, Part II (3 sem. cr.)

EDUC 6644 Supporting the Struggling Reader (3 sem. cr.)

EDUC 6645 Planning and Managing the Classroom Literacy Program (3 sem. cr.)

***Course Sequence*****First Semester**

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EDUC 6610 Teacher as Professional

EDUC 6641 Foundations of Reading and Literacy Development

### **Second Semester**

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EDUC 6615 Effective Teaching Using Learning Styles and Multiple Intelligences  
EDUC 6642 Strategies for Literacy Instruction, Part I

### **Third Semester**

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EDUC 6625 Habits of Mind: Thinking Skills to Promote Self-Directed Learning  
EDUC 6643 Strategies for Literacy Instruction, Part II

### **Fourth Semester**

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EDUC 6620 Collaborative Action Research  
EDUC 6644 Supporting the Struggling Reader

### **Fifth Semester**

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EDUC 6630 Instructional Models and Strategies  
EDUC 6645 Planning and Managing the Classroom Literacy Program

The Elementary Reading and Literacy (Grades K–6) specialization has a semester-based curriculum and, therefore, has a different academic calendar and procedures than the university's quarter-based curricula. For more details, call 888-627-1153 or consult [www.degrees4educators.com](http://www.degrees4educators.com).

## **Elementary Reading and Mathematics (Grades K–6) Specialization**

The Elementary Reading and Mathematics (Grades K–6) specialization is a 30-semester-credit program that offers teachers proven strategies to create classrooms that succeed in both reading and mathematics. Teachers enhance their instructional skills in reading while deepening their understanding of key mathematical concepts. They learn to foster literary and analytical skills in young learners using research-based strategies, proven diagnostic tools for struggling readers, and techniques to motivate learners. They also develop their understanding of the mathematics concepts that their K–6 students are expected to learn, and consequently, increase the effectiveness of their mathematics instruction. Each course is eight weeks in length, and there are two consecutive courses per semester. A professional program portfolio must be submitted before the degree is granted.

### ***Core Courses (9 sem. cr.)***

EDUC 6610 Teacher as Professional (3 sem. cr.)  
EDUC 6620 Collaborative Action Research (3 sem. cr.)  
EDUC 6677 Designing Curriculum and Instruction (3 sem. cr.)

### ***Specialization Courses (21 sem. cr.)***

EDUC 6642 Strategies for Literacy Instruction, Part I (3 sem. cr.)  
EDUC 6643 Strategies for Literacy Instruction, Part II (3 sem. cr.)  
EDUC 6644 Supporting the Struggling Reader (3 sem. cr.)  
MATH 6681 Elementary Mathematics: Number and Operations (3 sem. cr.)  
MATH 6682 Elementary Mathematics: Geometry and Measurement (3 sem. cr.)  
MATH 6683 Elementary Mathematics: Algebra (3 sem. cr.)  
MATH 6684 Elementary Mathematics: Data Analysis and Probability (3 sem. cr.)

## ***Course Sequence***

### **First Semester**

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EDUC 6610 Teacher as Professional  
EDUC 6642 Strategies for Literacy Instruction, Part I

### **Second Semester**

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EDUC 6643 Strategies for Literacy Instruction, Part II  
MATH 6681 Elementary Mathematics: Number and Operations

### **Third Semester**

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EDUC 6644 Supporting the Struggling Reader  
MATH 6682 Elementary Mathematics: Geometry and Measurement

### **Fourth Semester**

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EDUC 6677 Designing Curriculum and Instruction  
MATH 6683 Elementary Mathematics: Algebra

### **Fifth Semester**

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MATH 6684 Elementary Mathematics: Data Analysis and Probability  
EDUC 6620 Collaborative Action Research

The Elementary Reading and Mathematics (Grades K–6) specialization has a semester-based curriculum and, therefore, has a different academic calendar and procedures than the university's quarter-based curricula. For more details, call 888-627-1153 or consult [www.degrees4educators.com](http://www.degrees4educators.com).

## **Integrating Technology in the Classroom (Grades 3–12) Specialization**

The Integrating Technology in the Classroom (Grades 3–12) specialization is a 30-semester-credit program based on the standards of the International Society for Technology in Education. This specialization is designed to meet the needs of classroom teachers of grades 3–12, who want to use technology to enhance learning experiences in their classrooms. Program content focuses on the research and best practices related to the teacher as a professional, effective teaching using learning styles and multiple intelligences, collaborative action research, thinking skills to promote self-directed learning, instructional models and strategies, knowledge and beliefs about new technology, technology integration strategies, and managing change. Each course is eight weeks in length, and there are two consecutive courses per semester. The program is offered in a prescribed sequence for online cohorts of students. A professional program portfolio must be submitted before the degree is granted.

### ***Core Courses (15 sem. cr.)***

EDUC 6610 Teacher as Professional (3 sem. cr.)  
EDUC 6615 Effective Teaching Using Learning Styles and Multiple Intelligences (3 sem. cr.)  
EDUC 6620 Collaborative Action Research (3 sem. cr.)  
EDUC 6625 Habits of Mind: Thinking Skills to Promote Self-Directed Learning (3 sem. cr.)  
EDUC 6630 Instructional Models and Strategies (3 sem. cr.)

### ***Specialization Courses (15 sem. cr.)***

- EDUC 6661 Exploring New Technologies: The Impact on Society, Work, and Education (3 sem. cr.)  
EDUC 6662 Multimedia Tools: How to Research, Plan, and Communicate With Technology (3 sem. cr.)  
EDUC 6663 Integrating Technology in the Curriculum, Part I (3 sem. cr.)  
EDUC 6664 Integrating Technology in the Curriculum, Part II (3 sem. cr.)  
EDUC 6665 Technology, Leadership, and a Vision for the Future (3 sem. cr.)

### ***Course Sequence***

#### **First Semester**

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- EDUC 6610 Teacher as Professional  
EDUC 6661 Exploring New Technologies: The Impact on Society, Work, and Education

#### **Second Semester**

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- EDUC 6615 Effective Teaching Using Learning Styles and Multiple Intelligences  
EDUC 6662 Multimedia Tools: How to Research, Plan, and Communicate With Technology

#### **Third Semester**

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- EDUC 6625 Habits of Mind: Thinking Skills to Promote Self-Directed Learning  
EDUC 6663 Integrating Technology in the Curriculum, Part I

#### **Fourth Semester**

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- EDUC 6620 Collaborative Action Research  
EDUC 6664 Integrating Technology in the Curriculum, Part II

#### **Fifth Semester**

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- EDUC 6630 Instructional Models and Strategies  
EDUC 6665 Technology, Leadership, and a Vision for the Future

The Integrating Technology in the Classroom (Grades 3–12) specialization has a semester-based curriculum and, therefore, has a different academic calendar and procedures than the university's quarter-based curricula. For more details, call 888-627-1153 or consult [www.degrees4educators.com](http://www.degrees4educators.com).

## **Literacy and Learning in the Content Areas (Grades 6–12) Specialization**

The Literacy and Learning in the Content Areas (Grades 6–12) specialization is a 30-semester-credit program designed to help content area teachers of grades 6–12 improve their students' literacy skills. The program features research-based strategies to help teachers prepare struggling students for more complex, abstract, and sophisticated learning in the content area classroom, whether History, Science, Mathematics, Social Studies, English, or other. The program is based on the nationally accepted standards for teaching reading in the classroom as set forth by the International Reading Association. Each course is eight weeks in length, and there are two consecutive courses per semester. The program is offered in a prescribed sequence for online cohorts of students. A professional program portfolio must be submitted before the degree is granted.



### ***Core Courses (18 sem. cr.)***

EDUC 6610 Teacher as Professional (3 sem. cr.)  
EDUC 6615 Effective Teaching Using Learning Styles and Multiple Intelligences (3 sem. cr.)  
EDUC 6620 Collaborative Action Research (3 sem. cr.)  
EDUC 6625 Habits of Mind: Thinking Skills to Promote Self-Directed Learning (3 sem. cr.)  
EDUC 6671 Designing Curriculum, Instruction, and Assessment, Part I (3 sem. cr.)  
EDUC 6672 Designing Curriculum, Instruction, and Assessment, Part II (3 sem. cr.)

### ***Specialization Courses (12 sem. cr.)***

READ 6581 Reading in the Content Areas, Grades 6–12 (3 sem. cr.)  
READ 6582 Writing in the Content Areas, Grades 6–12 (3 sem. cr.)  
READ 6583 Technology and Literacy in the Content Areas, Grades 6–12 (3 sem. cr.)  
READ 6584 Supporting Struggling Readers, Grades 6–12 (3 sem. cr.)

### ***Course Sequence***

#### **First Semester**

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EDUC 6610 Teacher as Professional  
EDUC 6615 Effective Teaching Using Learning Styles and Multiple Intelligences

#### **Second Semester**

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EDUC 6671 Designing Curriculum, Instruction, and Assessment, Part I  
READ 6581 Reading in the Content Areas, Grades 6–12

#### **Third Semester**

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EDUC 6672 Designing Curriculum, Instruction, and Assessment, Part II  
READ 6583 Technology and Literacy in the Content Areas, Grades 6–12

#### **Fourth Semester**

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EDUC 6620 Collaborative Action Research  
READ 6582 Writing in the Content Areas, Grades 6–12

#### **Fifth Semester**

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EDUC 6625 Habits of Mind: Thinking Skills to Promote Self-Directed Learning  
READ 6584 Supporting Struggling Readers, Grades 6–12

The Literacy and Learning in the Content Areas (Grades 6–12) specialization is a semester-based curriculum and, therefore, has a different academic calendar and procedures than the university's quarter-based curricula. For more details on this specialization, call 888-627-1153 or consult [www.degrees4educators.com](http://www.degrees4educators.com).

## **Mathematics (Grades K–5) Specialization**

The Mathematics (Grades K–5) specialization is a 30-semester-credit program based on the National Council of Teachers of Mathematics' Standards for School Mathematics. This specialization is designed to help teachers improve their own mathematics content skills, which should lead to more effective teaching of mathematics. Program content focuses on the content areas of number and operations, geometry, measurement, algebra, and data analysis and probability, as well as on the research and best practices

related to the teacher as a professional, effective teaching using learning styles and multiple intelligences, collaborative action research, thinking skills to promote self-directed learning, instructional models and strategies, and knowledge and beliefs about designing curriculum, instruction, and assessment. Each course is eight weeks in length, and there are two consecutive courses per semester. The program is offered in a prescribed sequence for online cohorts of students. A professional program portfolio must be submitted before the degree is granted.

### ***Core Courses (18 sem. cr.)***

EDUC 6610 Teacher as Professional (3 sem. cr.)  
EDUC 6615 Effective Teaching Using Learning Styles and Multiple Intelligences (3 sem. cr.)  
EDUC 6620 Collaboration Action Research (3 sem. cr.)  
EDUC 6625 Habits of Mind: Thinking Skills to Promote Self-Directed Learning (3 sem. cr.)  
EDUC 6671 Designing Curriculum, Instruction, and Assessment, Part I (3 sem. cr.)  
EDUC 6672 Designing Curriculum, Instruction, and Assessment, Part II (3 sem. cr.)

### ***Specialization Courses (12 sem. cr.)***

MATH 6681 Elementary Mathematics: Number and Operations (3 sem. cr.)  
MATH 6682 Elementary Mathematics: Geometry and Measurement (3 sem. cr.)  
MATH 6683 Elementary Mathematics: Algebra (3 sem. cr.)  
MATH 6684 Elementary Mathematics: Data Analysis and Probability (3 sem. cr.)

### ***Course Sequence***

#### **First Semester**

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EDUC 6610 Teacher as Professional  
EDUC 6615 Effective Teaching Using Learning Styles and Multiple Intelligences

#### **Second Semester**

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MATH 6681 Elementary Mathematics: Number and Operations  
EDUC 6671 Designing Curriculum, Instruction, and Assessment, Part I

#### **Third Semester**

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MATH 6682 Elementary Mathematics: Geometry and Measurement  
EDUC 6672 Designing Curriculum, Instruction, and Assessment, Part II

#### **Fourth Semester**

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EDUC 6620 Collaborative Action Research  
MATH 6683 Elementary Mathematics: Algebra

#### **Fifth Semester**

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EDUC 6625 Habits of Mind: Thinking Skills to Promote Self-Directed Learning  
MATH 6684 Elementary Mathematics: Data Analysis and Probability

The Mathematics (Grades K–5) specialization is a semester-based curriculum and, therefore, has a different academic calendar and procedures than the university’s quarter-based curricula. For more details on this specialization, call 888-627-1153 or consult [www.degrees4educators.com](http://www.degrees4educators.com).

## Mathematics (Grades 6–8) Specialization

The Mathematics (Grades 6–8) specialization is a 30-semester-credit program designed to help mathematics teachers of grades 6–8 demonstrate high competency in the mathematics content they should be teaching. Teachers also learn proven research-based strategies and real-world applications to improve student achievement in mathematics. The program aligns with the National Council of Teachers of Mathematics' Standards for School Mathematics, addressing both content and process standards. Each course is eight weeks in length, and there are two consecutive courses per semester. The program is offered in a prescribed sequence for online cohorts of students. A professional program portfolio must be submitted before the degree is granted.

### *Core Courses (18 sem. cr.)*

EDUC 6610 Teacher as Professional (3 sem. cr.)  
EDUC 6615 Effective Teaching Using Learning Styles and Multiple Intelligences (3 sem. cr.)  
EDUC 6620 Collaborative Action Research (3 sem. cr.)  
EDUC 6625 Habits of Mind: Thinking Skills to Promote Self-Directed Learning (3 sem. cr.)  
EDUC 6671 Designing Curriculum, Instruction, and Assessment, Part I (3 sem. cr.)  
EDUC 6672 Designing Curriculum, Instruction, and Assessment, Part II (3 sem. cr.)

### *Specialization Courses (12 sem. cr.)*

MATH 6571 Number and Operations, Grades 6–8 (3 sem. cr.)  
MATH 6572 Geometry and Measurement, Grades 6–8 (3 sem. cr.)  
MATH 6573 Algebra, Grades 6–8 (3 sem. cr.)  
MATH 6574 Data Analysis and Probability, Grades 6–8 (3 sem. cr.)

### *Course Sequence*

#### **First Semester**

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EDUC 6610 Teacher as Professional  
EDUC 6615 Effective Teaching Using Learning Styles and Multiple Intelligences

#### **Second Semester**

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EDUC 6671 Designing Curriculum, Instruction, and Assessment, Part I  
MATH 6571 Number and Operations, Grades 6–8

#### **Third Semester**

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EDUC 6672 Designing Curriculum, Instruction, and Assessment, Part II  
MATH 6572 Geometry and Measurement, Grades 6–8

#### **Fourth Semester**

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EDUC 6620 Collaborative Action Research  
MATH 6573 Algebra, Grades 6–8

#### **Fifth Semester**

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EDUC 6625 Habits of Mind: Thinking Skills to Promote Self-Directed Learning  
MATH 6574 Data Analysis and Probability, Grades 6–8

The Mathematics (Grades 6–8) specialization is a semester-based curriculum and, therefore, has a different academic calendar and procedures than the university’s quarter-based curricula. For more details on this specialization, call 888-627-1153 or consult [www.degrees4educators.com](http://www.degrees4educators.com).

## **Middle Level Education (Grades 5–8) Specialization**

The Middle Level Education (Grades 5–8) specialization is a 30-semester-credit program that serves classroom educators in the middle grades who are interested in meeting the developmental and educational needs of young adolescents (ages 10–14), usually organized in schools with at least a grade seven. The program curriculum is based on the standards for Middle Level Teacher Preparation approved by the National Middle School Association and NCATE. This specialization is designed to meet the needs of teachers whose initial preparation was focused on the elementary school or the high school, the primary trend for many years. Program content focuses on the research and best practices related to young adolescent development, organizational structures for high-success middle grades schools, the middle grades curriculum continuum, pedagogy and assessment for student success, middle grades teaching content, connecting with families and community, and leadership in the learning organization. The specialization is offered in a prescribed sequence, and the capstone course must be completed during the final semester of enrollment. Graduates are prepared to better meet the needs of young adolescents in their own classrooms and to become change agents and leaders for the reforms that need to occur in their schools and communities.

### ***Specialization Courses (21 sem. cr.)***

- EDUC 6000 Success Strategies in the Online Environment (non-credit)
- EDUC 6510 Young Adolescent Development and Implications in a Global Society (3 sem. cr.)
- EDUC 6520 Organizational Structures for High-Performing Middle Grades Schools (3 sem. cr.)
- EDUC 6525 Concepts of Technology (3 sem. cr.)
- EDUC 6530 The Middle Grades Curriculum Continuum (3 sem. cr.)
- EDUC 6540 Pedagogy and Exemplary Practices for Learning in the Middle Grades (3 sem. cr.)
- EDUC 6550 Assessment and Evaluation as Tools for Student Success (3 sem. cr.)
- EDUC 6565 Arts Education for the Middle Level Educator (3 sem. cr.)

### ***Teaching Fields Content (6 sem. cr.)***

*Students select two of the following:*

- EDUC 6561 Mathematics for Middle Level Teachers (3 sem. cr.)
- EDUC 6562 Understanding and Teaching the Language Arts (3 sem. cr.)
- EDUC 6563 Science for Middle Level Teachers (3 sem. cr.)
- EDUC 6564 Understanding and Teaching the Social Studies (3 sem. cr.)

### ***Capstone Course (3 sem. cr.)***

- EDUC 6560 Middle Level Professional Roles (3 sem. cr.)

## ***Course Sequence***

### ***First Semester***

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- EDUC 6000 Success Strategies in the Online Environment
  - EDUC 6510 Young Adolescent Development and Implications in a Global Society

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**Second Semester**

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EDUC 6520 Organizational Structures for High-Performing Middle Grades Schools  
EDUC 6525 Concepts of Technology

**Third Semester**

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EDUC 6550 Assessment and Evaluation as Tools for Student Success  
EDUC 6530 The Middle Grades Curriculum Continuum

**Fourth Semester**

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*Students select two of the following courses. (Students may take one course in each of two 8-week sessions or may take both courses during one 8-week session.)*

EDUC 6561 Mathematics for Middle Level Teachers

*or*

EDUC 6562 Understanding and Teaching the Language Arts

EDUC 6563 Science for Middle Level Teachers

*or*

EDUC 6564 Understanding and Teaching the Social Studies

**Fifth Semester**

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EDUC 6565 Arts Education for the Middle Level Educator  
EDUC 6540 Pedagogy and Exemplary Practices for Learning in the Middle Grades

**Sixth Semester**

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EDUC 6560 Middle Level Professional Roles

The Middle Level Education (Grades 5–8) specialization is a semester-based curriculum and, therefore, has a different academic calendar and procedures than the university’s quarter-based curricula. For more details on this specialization, call 888-627-1153 or consult [www.degrees4educators.com](http://www.degrees4educators.com).

## **Science (Grades K–8) Specialization**

The Science (Grades K–8) specialization is a 33-semester-credit program designed to help teachers improve their own science content skills, which should lead to more effective teaching of science. The program is based on the standards of the National Science Teachers Association and comprises an introductory three-credit course and five 6-credit modules in which students receive three credits in science and three credits in education. Each module focuses on a particular science domain. Participants engage in scientific investigations to extend their understanding of concepts and skills, rethink teaching and assessment strategies, and try ideas in their own classrooms, in essence, a built-in practicum.

Each course module is taught by two instructors in one online classroom. The two instructors are 1) a scientist well-versed in the science domain of a given module who guides participants in their acquisition of key science content, skills, and values; and, 2) a science educator who supports participants as they consider pedagogical strategies for bringing science inquiry into their classrooms.

### ***Core Courses (15 sem. cr.)***

EDUC 6652 Listening to Children's Ideas (3 sem. cr.)  
EDUC 6654 Classroom Facilitation (3 sem. cr.)  
EDUC 6656 Curriculum Designed for Understanding (3 sem. cr.)  
EDUC 6658 Formative Assessment: Assessment for Learning (3 sem. cr.)  
EDUC 6660 Investigating Equitable Classrooms (3 sem. cr.)

### ***Specialization Courses (18 sem. cr.)***

SCIE 6650 Try Science (3 sem. cr.)  
SCIE 6651 Investigating Physics: Motion and Forces (3 sem. cr.)  
SCIE 6653 Biology Explorations: Explorations in Variation, Diversity, and Adaptation (3 sem. cr.)  
SCIE 6655 Earth Science from a New Perspective (3 sem. cr.)  
SCIE 6657 Ecology: Organisms, Nutrients, and the Environment (3 sem. cr.)  
SCIE 6659 Engineering: From Science to Design (3 sem. cr.)

### ***Course Sequence***

#### **First Semester**

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SCIE 6650 Try Science

#### **Second Semester**

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SCIE 6651 Investigating Physics: Motion and Forces  
EDUC 6652 Listening to Children's Ideas

#### **Third Semester**

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SCIE 6653 Biology Explorations: Explorations in Variation, Diversity, and Adaptation  
EDUC 6654 Classroom Facilitation

#### **Fourth Semester**

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SCIE 6655 Earth Science from a New Perspective  
EDUC 6656 Curriculum Designed for Understanding

#### **Fifth Semester**

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SCIE 6657 Ecology: Organisms, Nutrients, and the Environment  
EDUC 6658 Formative Assessment: Assessment for Learning

#### **Sixth Semester**

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SCIE 6659 Engineering: From Science to Design  
EDUC 6660 Investigating Equitable Classrooms

The Science (Grades K–8) specialization is a semester-based curriculum and, therefore, has a different academic calendar and procedures than the university's quarter-based curricula. For more details on this specialization, call 888-627-1153 or consult [www.degrees4educators.com](http://www.degrees4educators.com)

# Policies Unique to the M.S. in Education

Students enrolled in any of the M.S. in Education specializations should refer to the M.S. in Education *Student Guide* ([www.WaldenU.edu/mseducguide](http://www.WaldenU.edu/mseducguide)) for complete information on the program and other university policies and procedures related to these specializations. The policies and procedures listed below should be particularly noted.

## Application Materials

Application materials for these specializations should be requested by calling 888-627-1153 or can be downloaded at [www.degrees4educators.com](http://www.degrees4educators.com).

## Transfer of Credit

For the master's programs in education, the maximum credits accepted in transfer will be 9 semester credits (three courses of three semester credits to align with specialization courses). To be considered for acceptance in transfer from a U.S. institution, credits must meet the following criteria:

- Earned within five years prior to matriculating in the Walden University program or earned after matriculation and within the time limit for earning the degree.
- Transcribed as graduate credits on an official graduate transcript.
- Earned from an institution regionally accredited at the time the credits were earned.
- Earned in courses posting grades of *B* or higher (3.0 on a 4.0 grading scale).
- Earned in courses with content equivalent to the content of the corresponding Walden University courses or with content that is considered by Walden University to enhance the student's education.
- Approved in advance of the student taking the course, for those courses completed after matriculating as a Walden student.
- Not applied to any prior earned degree.

To be considered for acceptance in transfer, graduate credits or other units from foreign institutions must satisfy the criteria above and have been earned from an internationally recognized university.

### *Process for Transfer of Credit*

To apply for transfer credits, students must submit a credit-transfer request with their program application materials, or to the admissions office if the request is being made following admission to the program. Credit-transfer applications must be submitted and approved in advance (i.e., prior to enrolling in the course that will be transferred) for courses completed after matriculating as a Walden student.

The request must include a completed *Transfer of Credit Application* form and photocopies of catalog descriptions for the courses the student wants to transfer into the Walden University program. The university reserves the right to require copies of course syllabi in cases where catalog descriptions are not sufficient means to assess course content. Students should immediately request that an official transcript of the courses being considered for transfer be sent to Walden University. A transfer-of-credit decision cannot be made without an official transcript. Students requesting transfer of credits earned in foreign institutions may be required to submit the relevant material to an external credit evaluation service prior to Walden University making a judgment on the credit-transfer request.

Credit-transfer requests are reviewed and evaluated by the admissions office and program administrators when necessary. Once a decision is reached, the university notifies the student and records the decision in the student's file.

## Registration

Students in these specializations are automatically registered for courses following formal admission to the program and just prior to matriculation. The specializations are offered in a prescribed sequence as described in this catalog and the M.S. in Education *Student Guide* ([www.WaldenU.edu/mseducguide](http://www.WaldenU.edu/mseducguide)).

## APA Guidelines

All written work in these specializations must adhere to the format and style guidelines established by the American Psychological Association (APA), as described in the latest edition of the *Publication Manual of the American Psychological Association*.

## M.S. to Ph.D. Matriculation Requirements

M.S. in Education students preparing to matriculate from the Integrating Technology in the Classroom (Grades 3–12) specialization to the Educational Technology specialization of the Ph.D. in Education will complete a minimum of 72 quarter credits in the Ph.D. program.

Indiana University M.S. in Adult Education students preparing to matriculate to the Adult Education Leadership specialization of the Ph.D. in Education will complete a minimum of 72 quarter credits or the equivalent in the Ph.D. program. A student matriculating in the coordinated M.S. and Ph.D. programs must enroll for a minimum of eight academic quarters in the Ph.D. program.

# Ph.D. in Education

The Ph.D. in Education is a 134-credit program that is competency-based and produces leaders who can address the nation's most pressing educational challenges. Educators are expected to come to the program with defined learning goals and challenges and to participate in designing their own program of study. A General Program and specializations in seven established and newly emerging fields are available. For students whose particular learning interests are not met by one of the specializations or whose interests are interdisciplinary, the School of Education also offers an option that allows students to self-design a specialization to meet their unique needs.

## Specializations

- General Program
- Adult Education Leadership
- Community College Leadership
- Early Childhood Education
- Educational Technology
- Higher Education



- K–12 Educational Leadership
- Special Education
- Self-Designed

## **Degree Requirements**

- 134 quarter credits minimum
- Foundation course: SBSF 8005 (6 cr.)
- KAMs and/or courses, and Research Sequence (98 cr.)
- Satisfactory progress in all SBSF 7100 registrations
- Proposal, dissertation, and oral presentation (30 cr.)
- 32 residency units
- Minimum 8–10 quarters enrollment

## **Curriculum**

The Ph.D. in Education program requires mastery of knowledge in three areas, including the foundation social and behavioral sciences, scientific inquiry and research methodology, and the student’s specialized field chosen from a broad range of professional education studies. Students select their specialization at the outset of their program and complete their doctoral program by conducting original research and writing a results-oriented dissertation that demonstrates command of the discipline.

### **Core Curriculum**

The core curriculum comprises a Foundation course in doctoral studies, three Knowledge Area Modules (KAMs), and the Research Sequence.

#### ***Foundation Course (6 cr.)***

##### ***SBSF 8005 Foundations for Doctoral Study (6 cr.)***

All beginning Ph.D. in Education students are required to successfully complete this course, and are automatically enrolled in it during their first month. In this course, students develop a Professional Development Plan and a Plan of Study to guide the rest of their program, as well as their first Learning Agreement.

#### ***Core KAMS I–III (42 cr.)***

Core KAMs provide a foundation of knowledge and prepare students to enhance their professional practice in a constantly changing environment.

##### ***Core KAM I: Principles of Societal Development (14 cr.)***

As individuals and as professionals facing contemporary challenges, we must understand the contexts within which change takes place in our society, the variety of forces that operate to bring about change, the consequences of change, and our own role as change agents. Students examine the complex nature of societal change from the perspective of a variety of disciplines, including philosophy, ethics, sociology, psychology, economics, political science, anthropology, history, and futuristics, and then apply that knowledge through practical demonstration.

*Breadth:* SBSF 8110 Theories of Societal Development (5 cr.)

*Depth:* SBSF 8120 Current Research in Societal Development (5 cr.)

*Application:* SBSF 8130 Professional Practice and Societal Development (4 cr.)

***Core KAM II: Principles of Human Development (14 cr.)***

KAM II allows students to explore human development from a variety of perspectives, including those defined by biology, anthropology, and psychology. They examine how culture (e.g., race, nationality, ethnicity, social class, sex, sexual orientation, and disability) influences human development, and they come to know the individual as part of a larger context in a multicultural society.

*Breadth:* SBSF 8210 Theories of Human Development (5 cr.)

*Depth:* SBSF 8220 Current Research in Human Development (5 cr.)

*Application:* SBSF 8230 Professional Practice and Human Development (4 cr.)

***Core KAM III: Principles of Organizational and Social Systems (14 cr.)***

KAM III asks students to examine social systems theory to see how different parts of a system interact and to better analyze and understand education in the context of the larger society. The primary models of structured system theories are presented as a background and theoretical framework for other knowledge areas.

*Breadth:* SBSF 8310 Theories of Organizational and Social Systems (5 cr.)

*Depth:* SBSF 8320 Current Research in Organizational and Social Systems (5 cr.)

*Application:* SBSF 8330 Professional Practice and Organizational and Social Systems (4 cr.)

***Research Sequence (28 cr.)***

***Core Research Sequence (19 cr.)***

The four courses in the Core Research Sequence are conducted online, requiring weekly participation in discussions and assignments. Faculty instructors guide discussions, require specific readings, and evaluate assignments.

SBSF 8417 Research Seminar I: Human Inquiry and Science (4 cr.)

EDUC 8428 Research Seminar II: Design in Educational Research (5 cr.)

EDUC 8438 Research Seminar III: Quantitative Research in Education (5 cr.)

EDUC 8448 Research Seminar IV: Qualitative Research in Education (5 cr.)

***Advanced Research Sequence (9 cr.)***

The two courses in the Advanced Research Sequence are conducted as independent studies under the guidance of the faculty mentor or the dissertation chair. Students prepare a plan for the study that is submitted and evaluated by the faculty member before the study begins. The final study for both courses is assessed by the faculty member. These two courses are undertaken consecutively and relate to the dissertation/study project.

EDUC 8458 Advanced Research: Conducting Pilot and Field Studies (5 cr.)

EDUC 8468 Advanced Research: Communicating Knowledge in Educational Research (4 cr.)

## **Specialized Curriculum**

The General Program and the specializations in Early Childhood Education, Higher Education, and Special Education include specialized KAMs (V and VI) and are designed to allow students to focus

on theoretical issues within their chosen disciplines. Through research, students compare contemporary professional practices, strategies, and ethics.

The Community College Leadership and K–12 Educational Leadership specializations allow a practicum to be taken in place of the Advanced Research Sequence. The specializations in Adult Education Leadership and K–12 Educational Leadership use a specialized curriculum that includes 28 credits of online coursework instead of specialized KAMs.

The specialization in Educational Technology, which is designed to reflect the International Society for Technology in Education standards in Technology Facilitation and Technological Leadership, uses a specialized curriculum that includes 37 credits of online coursework in place of specialized KAMs and the Advanced Research Sequence.

### ***General Program***

The General Program is intended for students whose professional practice and career goals cover a range of educational topics or are interdisciplinary, combining specific education subjects with complementary subjects from the social and behavioral sciences or the humanities.

***SBSF 8005 Foundations for Doctoral Study (6 cr.)***

***Core KAMs I–III as described under the Core Curriculum (42 cr.)***

***Core Research Sequence as described under the Core Curriculum (19 cr.)***

***Specialized KAM V: Theories of Intelligence, Learning, and Motivation (14 cr.)***

This KAM examines theoretical foundations of the learning process with its associated phenomena, such as intelligence, cognition, motivation, and their implications for educators. Students demonstrate mastery of classical and contemporary theory and research knowledge as background for use in teaching, and learning facilitation of, students in a range of educational settings.

*Breadth:* EDUC 8510 Theories of Intelligence, Learning, and Motivation as a Basic Praxis (5 cr.)

*Depth:* EDUC 8520 Educators as Facilitators of Learning for Diverse Populations (5 cr.)

*Application:* EDUC 8530 Professional Practice Using Learning Theories (4 cr.)

***Specialized KAM VI: Learning Institutions: Organization, Purpose, Goals, and Missions (14 cr.)***

This KAM examines critical issues in the organization and planning of learning institutions. Students research and identify principles of effective practice, identify and sharpen skills in planning and implementing instructional programs, and develop educational leadership abilities.

*Breadth:* EDUC 8610 The Organization of Learning Institutions (5 cr.)

*Depth:* EDUC 8620 Social Change in Learning Institutions and Curricula (5 cr.)

*Application:* EDUC 8630 Creating and Implementing Educational Change (4 cr.)

***Advanced Research Sequence as described under the Core Curriculum (9 cr.)***

***Dissertation (30 cr.)***

EDUC 9000 Dissertation (30 cr.)

## ***Adult Education Leadership Specialization***

Recently, American business, industry, government, and nonprofit organizations spent more than \$23 billion to train and develop their workforce to succeed in today's highly competitive global markets. This specialization, offered by Walden University in partnership with the Indiana University School of Continuing Studies, guides students in developing the knowledge and skills required to conceive, plan, and deliver highly effective corporate training and development activities using the latest techniques, electronic technologies, and learning strategies.

### ***SBSF 8005 Foundations for Doctoral Study (6 cr.)***

### ***Core KAMs I–III as described under the Core Curriculum (42 cr.)***

### ***Core Research Sequence as described under the Core Curriculum (19 cr.)***

### ***Specialized Courses (28–30 cr.)***

*Note: Courses listed below with a D prefix are delivered electronically by the Indiana University (IU) School of Continuing Studies and are cross-listed as Walden University courses (EDUC prefix). Students register through Walden University using EDUC course numbers. All courses are delivered on the IU semester academic calendar.*

EDUC 8515 (D500) Introduction to Adult Education Theory (5 cr.)

EDUC 8525 (D506) Adult Education Planning and Development (5 cr.)

EDUC 8535 (D600) Seminar in the Teaching-Learning Transaction in Adult Education (5 cr.)

EDUC 8615 (D512) Seminar in Forms and Forces of Adult Education (5 cr.)

EDUC 8625 (D613) The Organizational Context of Adult Education (5 cr.)

*Students select one of the following courses:*

EDUC 8634 (D523) Small-Group Theory in Adult Education (5 cr.)

EDUC 8635 (D521) Participation Training (3 cr.)

EDUC 8636 (D660) Readings in Adult Education (3–5 cr.)

### ***Advanced Research Sequence as described under the Core Curriculum (9 cr.)***

### ***Dissertation (30 cr.)***

EDUC 9000 Dissertation (30 cr.)

## ***Community College Leadership Specialization***

“Community colleges are facing an impending crisis in leadership.” This statement echoes throughout the community college literature of the last decade and is the opening sentence of an executive summary of a recent report from the American Association of Community Colleges (AACC). The magnitude of the crisis was highlighted in the results of a national Leadership Survey conducted by AACC in 2001 that found over 50 percent of community college presidents and an even higher percentage of senior administrators would be retiring by 2007.

Concurrently, America's community colleges will undergo profound changes as the student population shifts predominantly to mature, working adults and as the methods of teaching and learning change to electronic modes and other distance approaches. Students in the Community College Leadership specialization (whether from the perspective of president, academic leader, student services, technology specialist, specific area program officer, or other leadership position within the community college) will develop proficiency in knowing how individuals, particularly

adults, learn most effectively, what tools and strategies best promote learning, and how educational systems and policies can be changed to promote the academic mission of the community college in today's society.

***SBSF 8005 Foundations for Doctoral Study (6 cr.)***

***Core KAM I: Principles of Societal Development (14 cr.)***

*Breadth:* SBSF 8110 Theories of Societal Development (5 cr.)

*Depth:* EDUC 8122 Current Research on Social Change and Community Colleges (5 cr.)

*Application:* EDUC 8132 Professional Practice, Social Change, and Community Colleges (4 cr.)

***Core KAM II: Principles of Human Development (14 cr.)***

*Breadth:* SBSF 8210 Principles of Human Development (5 cr.)

*Depth:* EDUC 8222 Current Research in Human Development and Community Colleges (5 cr.)

*Application:* EDUC 8232 Professional Practice, Human Development, and Community Colleges (4 cr.)

***Core KAM III: Principles of Organizational and Social Systems (14 cr.)***

*Breadth:* SBSF 8310 Theories of Organizational and Social Systems (5 cr.)

*Depth:* EDUC 8322 Current Research on Social Systems and Community Colleges (5 cr.)

*Application:* EDUC 8332 Professional Practice, Social Systems, and Community Colleges (4 cr.)

***Core Research Sequence as described under the Core Curriculum (19 cr.)***

***Specialized KAM V: The Contemporary Community College (14 cr.)***

*Breadth:* EDUC 8512 Perspectives on the Role of the Community College (5 cr.)

*Depth:* EDUC 8522 Current Research on Trends in the Community College (5 cr.)

*Application:* EDUC 8532 Professional Practice and Current Trends in Community Colleges (4 cr.)

***Specialized KAM VI: Leadership and Strategic Planning in the Community College (14 cr.)***

*Breadth:* EDUC 8612 Perspectives on Leadership and Strategic Planning in Community Colleges (5 cr.)

*Depth:* EDUC 8622 Current Research on Leadership and Strategic Planning in Community Colleges (5 cr.)

*Application:* EDUC 8632 Professional Practice in Leadership and Strategic Planning in Community Colleges (4 cr.)

***Advanced Research Sequence as described under the Core Curriculum (9 cr.)***

*or*

***Practicum***

EDUC 8883 Practicum in Community College Leadership (9 cr.)

***Dissertation (30 cr.)***

EDUC 9000 Dissertation (30 cr.)

***Early Childhood Education Specialization***

As the demographics of the family and workforce change, the nation is increasingly turning its attention to the critical need for early child development and education. The Early Childhood Education specialization guides students in developing the expertise to lead in the creation and implementation of new program practices, to apply emerging research on development in the early years, and to conceptualize new paradigms for early learning.

The core KAM curriculum in the foundation social and behavioral sciences is aimed at a range of unique early childhood topics and research perspectives.

***SBSF 8005 Foundations for Doctoral Study (6 cr.)***

***Core KAM I: Principles of Societal Development (14 cr.)***

*Breadth:* SBSF 8110 Theories of Societal Development (5 cr.)

*Depth:* EDUC 8123 Theoretical Foundations of Early Childhood Program Practices (5 cr.)

*Application:* EDUC 8133 Theory to Practice: Curriculum Contrasts and Implementation (4 cr.)

***Core KAM II: Principles of Human Development (14 cr.)***

*Breadth:* SBSF 8210 Theories of Human Development (5 cr.)

*Depth:* EDUC 8223 Current Research: Psychological Foundations of Early Childhood Growth and Development (5 cr.)

*Application:* EDUC 8233 Psychological Considerations in Application to Early Childhood Programs (4 cr.)

***Core KAM III: Principles of Organizational and Social Systems (14 cr.)***

*Breadth:* SBSF 8310 Theories of Organizational and Social Systems (5 cr.)

*Depth:* EDUC 8323 Early Childhood Education: Implications for Social and Organizational Systems (5 cr.)

*Application:* EDUC 8333 Professional Practice in Organizational and Social Contexts (4 cr.)

***Core Research Sequence as described under the Core Curriculum (19 cr.)***

***Specialized KAM V: Theories of Intelligence, Learning, and Motivation in Early Childhood Education (14 cr.)***

This is an analysis of intelligence and motivation theories applicable to the child under 8 years of age. Implications for educators, political leaders, policy-makers, and early childhood advocates are examined. Fiscal policy and imperatives are explored in relation to programming for varied learning and motivational styles.

*Breadth:* EDUC 8513 Theories of Intelligence, Learning, and Motivation: Birth to Age 8 (5 cr.)

*Depth:* EDUC 8523 Early Childhood Program Delivery in a Multicultural/Multifaceted Society (5 cr.)

*Application:* EDUC 8533 Professional Practice Using Learning and Motivational Theory in Context (4 cr.)

***Specialized KAM VI: Critical Issues in the Organization and Planning of Early Childhood Education Programs (14 cr.)***

Critical issues are explored in the organization and planning of early childhood programs, including theoretical perspectives on early childhood education organization, developmentally appropriate practices, and environmental and advocacy issues in early childhood organizational contexts. Depth and application sections examine licensure and accreditation standards, role of federal and state governments, policy and resource allocation, cultural diversity, ramifications of current brain research for program development, and application of early childhood education programs with focus on theory, design, execution, and evaluation.

*Breadth:* EDUC 8613 Organization of Early Childhood Education Programs (5 cr.)

*Depth:* EDUC 8623 Critical Issues in Early Childhood Education Programs (5 cr.)

*Application:* EDUC 8633 Early Childhood Programs: A Comprehensive Approach (4 cr.)

***Advanced Research Sequence as described under the Core Curriculum (9 cr.)***

***Dissertation (30 cr.)***

EDUC 9000 Dissertation (30 cr.)

***Educational Technology Specialization***

Today, more than 90 percent of American schools and more than 60 percent of American classrooms are wired for Internet use. The Educational Technology specialization develops leaders who can effectively apply technology to learning and teaching in schools, school districts, and other learning environments. The curriculum guides students in becoming highly skilled in course development and delivery using technology, integration of technology in the curriculum, cognition and technology-based instruction, and the management of technology for improved learning.

***SBSF 8005 Foundations for Doctoral Study (6 cr.)***

***Core KAMs I–III as described under the Core Curriculum (42 cr.)***

***Core Research Sequence as described under the Core Curriculum (19 cr.)***

***Specialization Courses (37 cr.)***

EDUC 8806 Educational Measurement and Evaluation (4 cr.)

EDUC 8807 Curriculum Theory and Design (4 cr.)

EDUC 8812 Critical Survey of Technology (4 cr.)

EDUC 8813 Management of Technology for Education (4 cr.)

EDUC 8814 Learning Theories and Instructional Technology (4 cr.)

EDUC 8823 Computer Technology and Multimedia in Education (4 cr.)

EDUC 8824 Integration of Technology in the Curriculum (4 cr.)

EDUC 8825 Course Development and Delivery Utilizing Technology (4 cr.)

EDUC 8826 Planning and Implementing Instructional Technological Environments (5 cr.)

***Dissertation (30 cr.)***

EDUC 9000 Dissertation (30 cr.)

***Higher Education Specialization***

During the 21st century, America's colleges and universities will undergo profound changes as the student population shifts predominantly to mature, working adults and as the methods of teaching and learning change to electronic modes and other distance approaches. Students in the Higher Education specialization develop proficiency in knowing how individuals, particularly adults, learn most effectively, what tools and strategies best promote learning and in what contexts, and how educational systems and policies can be changed to create focused learning opportunities. Contexts for the study of higher education include community colleges; private and public liberal arts colleges; distance-learning institutions; regional and state universities; proprietary, technical, and trade schools; state and federal agencies; and national professional associations.

***SBSF 8005 Foundations for Doctoral Study (6 cr.)***

***Core KAM I: Principles of Societal Development (14 cr.)***

*Breadth:* SBSF 8110 Theories of Societal Development (5 cr.)

*Depth:* EDUC 8127 Current Research in Higher Education, Social Change, and Development (5 cr.)

*Application:* EDUC 8137 Professional Practice and Emerging Trends in Higher Education (4 cr.)

***Core KAM II: Principles of Human Development (14 cr.)***

*Breadth:* SBSF 8210 Theories in Human Development (5 cr.)

*Depth:* EDUC 8227 Current Research in Ways of Knowing and Individual Differences in Human Development (5 cr.)

*Application:* EDUC 8237 Professional Practice and Human Development in Higher Education (4 cr.)

***Core KAM III: Principles of Organizational and Social Systems (14 cr.)***

*Breadth:* SBSF 8310 Theories of Organization and Social Systems (5 cr.)

*Depth:* EDUC 8327 Current Research in Social Systems and Change in Higher Education (5 cr.)

*Application:* EDUC 8337 Professional Practice in Social Systems and Change: Higher Education (4 cr.)

***Core Research Sequence as described under the Core Curriculum (19 cr.)***

***Specialized KAM V: Adult Learning in the Higher Education Context (14 cr.)***

KAM V explores theoretical foundations of adult learning that concern processes of learning and contexts in which learning occurs. These phenomena are examined from the perspectives of various disciplines. Included is an analysis of a particular perspective on adult learning processes and identification of approaches/methods supporting that perspective and implications of teaching-learning transactions. The use of technology to promote and support adults' learning are addressed. This knowledge is applied by assessing a selected area of practice, relating its congruence with a theory/model of adult learning, and proposing ways to improve the practice.

*Breadth:* EDUC 8517 Multiple Perspectives on Adult Learning Processes and Contexts (5 cr.)

*Depth:* EDUC 8527 Processes, Methods, and Strategies for Effective Teaching and Learning of Adults (5 cr.)

*Application:* EDUC 8537 Improving Practice Using Adult Learning Theories (4 cr.)

***Specialized KAM VI: Effectiveness of Higher Education Organizations (14 cr.)***

This is a review and analysis of major efforts to demand and demonstrate effectiveness in higher education from the perspectives of constituents, providers, and regulators/evaluators. The focus is on quality improvements called for by external constituents and the improvement strategies initiated by internal participants. The evaluation of evidence for the efficacy of various approaches to improvement is emphasized.

*Breadth:* EDUC 8617 Perspectives on the Effectiveness of Higher Education (5 cr.)

*Depth:* EDUC 8627 Contemporary Strategies for the Improvement of Effectiveness in Higher Education (5 cr.)

*Application:* EDUC 8637 Application of Improvement Strategies in Higher Education (4 cr.)

***Advanced Research Sequence as described under the Core Curriculum (9 cr.)***

***Dissertation (30 cr.)***

EDUC 9000 Dissertation (30 cr.)



## ***K–12 Educational Leadership Specialization***

Second only to the impending teacher shortage in America is the developing shortage of educational leadership at school, district, and state levels. The K–12 Educational Leadership specialization provides a much-needed new model for advanced study in this field. A highly flexible, student-centered curriculum is designed to develop local, regional, and state educational leaders who can relate to diverse, multicultural, K–12, and community-based school populations.

***Note on certification and licensure:*** *Students undertaking the K–12 Educational Leadership specialization should possess a valid administrative credential or, in appropriate cases, they may seek to use the Walden University Ph.D. degree to satisfy certification/licensure requirements in their respective states. The specialization has been designed following both National Council for Accreditation of Teacher Education (NCATE) and the Interstate School Leaders Licensure Consortium (ISLLC) published standards for programs in educational leadership. Acceptance of the Walden University Ph.D. by individual states for the satisfaction of certification or licensure requirements rests with each state. Students are advised to consult directly with their state certification/licensure authority for further information. Walden University does not directly provide administrative certification or licensure in any state.*

The core KAM curriculum in the foundational social and behavioral sciences is designed to advance scholar-practitioners in the area of education leadership, organizational development, policy studies, and administration and management.

### ***SBSF 8005 Foundations for Doctoral Study (6 cr.)***

#### ***Core KAM I: Principles of Societal Development (14 cr.)***

*Breadth:* SBSF 8110 Theories of Societal Development (5 cr.)

*Depth:* EDUC 8128 Strategic Leadership in Education and Societal Development (5 cr.)

*Application:* EDUC 8138 Professional Practice in Strategic Leadership and Societal Development (4 cr.)

#### ***Core KAM II: Principles of Human Development (14 cr.)***

*Breadth:* SBSF 8210 Theories of Human Development (5 cr.)

*Depth:* SBSF 8220 Current Research in Human Development (5 cr.)

*Application:* SBSF 8230 Professional Practice in Human Development (4 cr.)

#### ***Core KAM III: Principles of Organizational and Social Systems (14 cr.)***

*Breadth:* SBSF 8310 Theories of Organizational and Social Systems (5 cr.)

*Depth:* EDUC 8328 Current Research in Organizational and Social Systems: K–12 Education (5 cr.)

*Application:* EDUC 8338 Professional Practice in K–12 Educational Organization (4 cr.)

### ***Core Research Sequence as described under the Core Curriculum (19 cr.)***

#### ***Specialization Courses (28 cr.)***

EDUC 8801 Educational Law, Public Policy, and Political Systems (4 cr.)

EDUC 8802 Supervision, Evaluation, and Human Resources in Education (4 cr.)

EDUC 8803 Student Personnel Services (4 cr.)

EDUC 8804 School Financial Management (4 cr.)

EDUC 8805 Reflective Instructional Practice (4 cr.)

EDUC 8806 Educational Measurement and Evaluation (4 cr.)

EDUC 8807 Curriculum Theory and Design (4 cr.)

***Advanced Research Sequence as described under the Core Curriculum (9 cr.)***

*or*

***EDUC 8811 Practicum in K–12 Leadership (9 cr.)***

For advanced students seeking an administrative certificate or license.

***Dissertation (30 cr.)***

EDUC 9000 Dissertation (30 cr.)

### ***Special Education Specialization***

Most K–12 educators are strong advocates for improved services for exceptional/disabled individuals. Unfortunately, resources for the delivery of these services are often far less than schools and school districts desire. This specialization guides advanced students in the acquisition of knowledge and resources necessary to provide leadership in the special education field and to better assist their own students in the self-actualization process. The curriculum emphasizes learning services for exceptional/disabled individuals and incorporates the related areas of special education administration, including law, finance, and ethics.

***SBSF 8005 Foundations for Doctoral Study (6 cr.)***

***Core KAM I: Principles of Societal Development (14 cr.)***

*Breadth:* SBSF 8110 Theories of Societal Development (5 cr.)

*Depth:* EDUC 8121 Current Research in Societal Development: Special Education (5 cr.)

*Application:* EDUC 8131 Professional Practice and Societal Development: Special Education (4 cr.)

***Core KAM II: Principles of Human Development (14 cr.)***

*Breadth:* SBSF 8210 Theories of Human Development (5 cr.)

*Depth:* EDUC 8221 Current Research in Human Exceptionality (5 cr.)

*Application:* EDUC 8231 Professional Practice and Human Exceptionality (4 cr.)

***Core KAM III: Principles of Organizational and Social Systems (14 cr.)***

*Breadth:* SBSF 8310 Theories of Organizational and Social Systems (5 cr.)

*Depth:* EDUC 8321 Individuals With Special Needs: Social, Legal, Political, and Economic Systems in Context (5 cr.)

*Application:* EDUC 8331 Professional Issues in Organizations and Systems: Special Education (4 cr.)

***Core Research Sequence as described under the Core Curriculum (19 cr.)***

***Specialized KAM V: Theories of Learning, Motivation, and Intelligence; and Implications for Persons With Special Needs (14 cr.)***

KAM V covers traditional, current, and emerging theoretical underpinnings and principles of learning and exceptionality and related facets, as well as implications for educators within the context of inclusive or categorical settings.

*Breadth:* EDUC 8511 Theories and Principles of Human Learning and the Human Side of Exceptionalities (5 cr.)

*Depth:* EDUC 8521 Educators as Facilitators of Inclusive Learning in Varied Educational Environments (5 cr.)

*Application:* EDUC 8531 Educational Practice Grounded in Principles/Theories of Learning, Diversity, and Inclusion (4 cr.)

***Specialized KAM VI: Institutional Contexts for Special Education: Leadership, Learning, and Accommodation (14 cr.)***

This KAM reviews delivery models for special education services and their administration. Attention is focused on the dynamics of IEP team operation, eligibility criteria, assessment procedures, and community support systems with particular reference to compliance with law. Alternative and innovative models of leadership for special education programming are explored.

*Breadth:* EDUC 8611 Diversity and Exceptionality in Special Education: Leading Within Learning Organizations (5 cr.)

*Depth:* EDUC 8621 Due Process in Special Education: Legal and Moral Implications (5 cr.)

*Application:* EDUC 8631 Practical Issues in Placement and Service Delivery (4 cr.)

***Advanced Research Sequence as described under the Core Curriculum (9 cr.)***

***Dissertation (30 cr.)***

EDUC 9000 Dissertation (30 cr.)

***Self-Designed Specialization***

Some educators are interested in fields that are just emerging and are not as yet recognized as areas of specialization. The Self-Designed specialization, working within the rubric provided by the General Program, allows such individuals to create a program of study that is clearly focused on new and emerging ideas and practices. Examples include, but are not limited to, K–12 curriculum and instruction, community college teaching, mathematics education, science education, adult literacy, international education, middle level education, music and arts education, teaching English as a second language, and vocational education.

**Declaring a Self-Designed Specialization**

Students exercising this option design and declare the specialization in conjunction with the development of the Professional Development Plan. The Professional Development Plan must clearly reflect how the student intends to integrate the self-designed specialization into the depth and application sections of all the KAMs, as well as the dissertation. The breadth component of the specialized KAMs must also support the specialization; however, the breadth component of the core KAMs is not used to support specializations. Students should complete the *Program of Study* form using the education General Program specialization course numbers for the breadth, depth, and application components of each KAM. The depth and application components should include a subtitle that reflects the focus of the student's own unique self-designed specialization. In the specialized KAMs, the titles of the breadth component must also reflect the unique, self-designed specialization.

**Completing a Self-Designed Specialization**

To complete a self-designed specialization, students follow the course of study outlined in the Professional Development Plan, demonstrating doctoral-level competency in all academic work in the specialization area. Academic work that does not adequately support the declared specialization will be returned to the student for revision. Upon validation of degree-completion requirements, the specialization title is identified on official transcripts.

# Doctor of Education (Ed.D.)

Walden's Ed.D. program has two specializations in leadership: Teacher Leadership and Administrator Leadership for Teaching and Learning. Both are semester-based programs designed for educators who want to continue their practice while assuming leadership roles in their schools and communities.

## Program Goals

Students completing the Ed.D. program will

- make an original contribution to the field of education,
- influence public debates related to children's education,
- challenge assumptions related to critical educational issues of the day,
- conduct intellectual examinations of assumptions,
- demonstrate passionate beliefs in ideas,
- model lifelong learner characteristics, and
- collaborate with professional colleagues and others.

## Program Performance Threads and Outcomes

The curricular framework of the Ed.D. program is built upon four performance threads and outcomes. While these performance threads and outcomes are woven throughout the program, they are most prevalent in the Proseminars.

- The *performance thread* is the action theme that drives the content, process, and product of students' studies in this program.
- *Outcomes* are the behaviors that students will be engaged in that provide evidence for the performance thread.

It is expected that students in the Ed.D. program will develop expertise in the following performance threads and outcomes to promote equity and excellence in student achievement:

### ***Performance Thread I: Acquiring an inquiry stance***

Outcome: Inquire into learning, teaching, and leading from the perspective of an educator-researcher and educator-scholar to inform learning, achievement, and educational practices.

### ***Performance Thread II: Synthesizing and applying theories and practices of personal and professional development with self, colleagues, and the global community***

Outcome: Develop understandings and use of theories about educator learning, teaching for understanding, leadership, and lifelong educator professional development to influence state-of-the-art, contextual professional development programming for professional colleagues and the larger community.

### ***Performance Thread III: Influencing, advocating, and contributing to communities of professional practice within schools and in the global community***

Outcome: Lead communities of educator learners engaged in reflexive praxis, decision-making, and the social processes of active participation in practitioner inquiry to inform and improve learning for children.

***Performance Thread IV: Contributing to the professional body of knowledge to address and influence educational problem-solving and decision-making***

Outcome: Produce original works applicable for educational reculturalization to influence positive social change through democratic processes in schools and the professional and global communities.

Embedded within the program design are standards developed by the Interstate School Leaders Licensure Consortium and the National Staff Development Council. Students must have access to a classroom learning environment for inquiry into and refinement of personal teaching talent.

## **Specializations**

- Administrator Leadership for Teaching and Learning
- Teacher Leadership

## **Degree Requirements**

- 54 semester credits
- Foundation course (6 sem. cr.)
- Proseminars (18 sem. cr.)
- Research Sequence (18 sem. cr.)
- Doctoral study (12 sem. cr.)
- Residency

## **Curriculum**

### **Administrator Leadership for Teaching and Learning Specialization**

The specialization in Administrator Leadership for Teaching and Learning is designed for administrators who desire to develop the knowledge, abilities, and dispositions of researchers, scholar-practitioners, and teacher educators, and to be recognized as educational scholar-practitioners in their own right. The curriculum is founded on continual leadership development and renewal as a professional educator in regard to administrative leadership. The program provides an opportunity for administrative educational leaders to learn, embrace, and act upon becoming powerful agents of change in reforming schools.

#### ***Foundation Course (6 sem. cr.)***

EDAD 8001 Foundations for Doctoral Study (6 sem. cr.)

#### ***Proseminars (18 sem. cr.)***

EDAD 8011 Proseminar: Leading to Promote Learning (6 sem. cr.)

EDAD 8021 Proseminar: Leading Communities of Practice (6 sem. cr.)

EDAD 8031 Proseminar: Leading for Social Change (6 sem. cr.)

### ***Research Sequence (18 sem. cr.)***

EDAD 8015 Research Approaches (6 sem. cr.)  
EDAD 8025 Quantitative Research (6 sem. cr.)  
EDAD 8035 Qualitative Research (6 sem. cr.)

### ***Doctoral Study (12 sem. cr.)***

EDAD 8090 Doctoral Study Intensive (12 sem. cr.)

### ***Course Sequence by Semester***

Semester	Course
1	EDAD 8001 Foundations for Doctoral Study (6 sem. cr.)
2	EDAD 8011 Proseminar: Leading to Promote Learning (6 sem. cr.)
3	EDAD 8015 Research Approaches (6 sem. cr.)
4	EDAD 8021 Proseminar: Leading Communities of Practice (6 sem. cr.)
5*	EDAD 8025* Quantitative Research (6 sem. cr.)
6	EDAD 8031 Proseminar: Leading for Social Change (6 sem. cr.)
7*	EDAD 8035* Qualitative Research (6 sem. cr.)
8	EDAD 8090 Doctoral Study Intensive (6 sem. cr.)
9	EDAD 8090 Doctoral Study Intensive – continued (6 sem. cr.)

*\*EDAD 8025 and EDAD 8035 can be taken in any order. Students, in consultation with their mentors, will determine which course is initially instrumental for their doctoral study during EDAD 8021.*

## **Teacher Leadership Specialization**

The specialization in Teacher Leadership focuses on the “teacher as leader” and empowers experienced teachers to effect change and improve student learning. This degree program explores leadership in learning and teaching. Unlike doctoral programs that are designed to lead educators out of the classroom into positions as principals, superintendents, or other administrators, this degree is intended for educators whose aspirations are to perfect the art and science of teaching and to use their talents where they matter most—to improve learning among students in the classroom and to impact conditions for learning at the school, district, and state levels.

### ***Foundation Course (6 sem. cr.)***

EDUC 8000 Foundations for Doctoral Study (6 sem. cr.)

### ***Proseminars (18 sem. cr.)***

EDUC 8010 Proseminar: Leadership in Teaching and Learning (6 sem. cr.)  
EDUC 8020 Proseminar: Teacher Leadership in the School (6 sem. cr.)  
EDUC 8030 Proseminar: Teacher Leadership Beyond the School (6 sem. cr.)

### ***Research Sequence (18 sem. cr.)***

EDUC 8015 Research Approaches (6 sem. cr.)  
EDUC 8025 Quantitative Research (6 sem. cr.)  
EDUC 8035 Qualitative Research (6 sem. cr.)

### ***Doctoral Study (12 sem. cr.)***

EDUC 8090 Doctoral Study Intensive (12 sem. cr.)

### ***Course Sequence by Semester***

Semester	Course
1	EDUC 8000 Foundations for Doctoral Study (6 sem. cr.)
2	EDUC 8010 Proseminar: Leadership in Teaching and Learning (6 sem. cr.)
3	EDUC 8015 Research Approaches (6 sem. cr.)
4	EDUC 8020 Proseminar: Teacher Leadership in the School (6 sem. cr.)
5*	EDUC 8025* Quantitative Research (6 sem. cr.)
6	EDUC 8030 Proseminar: Teacher Leadership Beyond the School (6 sem. cr.)
7*	EDUC 8035* Qualitative Research (6 sem. cr.)
8	EDUC 8090 Doctoral Study Intensive (6 sem. cr.)
9	EDUC 8090 Doctoral Study Intensive – continued (6 sem. cr.)

*\*EDUC 8025 and EDUC 8035 can be taken in any order. Students, in consultation with their mentors, will determine which course is initially instrumental for their doctoral study during EDUC 8020.*

## **Residency Requirements**

The Ed.D. residency program allows students the opportunity to experience both face-to-face and online interactions, providing the foundation, stimulus, and direction for the intended outcomes of their degree program. These core questions guide students in the Ed.D. residencies:

- How can I develop my scholarly reading, writing, critiquing, and dialogue skills?
- How can I establish a balance (face-to-face and online) that enhances and extends my scholarly and research community?
- How can I fulfill both my personal and university goals?
- How can I integrate and align program standards and outcomes as evidence of my learning?

Ed.D. students must complete the following three residencies, one during each year of the program.

### ***Residency 1: Face-to-Face Introduction Residency***

During the first year of the program, students register and attend a three-day session in either January or July. The goal of this residency is to establish clear and strong networking connections with Walden University and the School of Education's faculty, staff, and colleagues.

**Residency 1 Objectives**

- To gain an understanding of the expectations/program outcomes of Walden University and the Ed.D. program.
- To gain an understanding the services, policies, and procedures of Walden University and the Ed.D. program.
- To continually develop the necessary scholarly skills to ensure successful completion of the doctoral program.
- To meet, establish, and sustain a scholarly research network within the university/school.

***Residency 2: Online Synchronous Residency***

During the second year of the program, students register and attend a three-day session in either April or October. The goal of this residency is to synthesize and apply the goals of Walden University with the personal commitment of social change.

**Residency 2 Objectives**

- To understand and plan to implement the policies and procedures required for the doctoral study.
- To apply the theories and practices of social change to the doctoral study process.
- To explore, discuss, and critique research models and designs.
- To explain, support, and/or defend the doctoral study topic to colleagues.

***Residency 3: National Conference Residency***

During the third year of the program, students develop and submit a proposal (based on their doctoral study) to present a session at a three- to five-day national professional conference, partnering with Walden University. The goal of this residency is to demonstrate the ability and commitment to influence others in promoting positive social change.

**Residency 3 Objectives**

- To develop and submit a presentation proposal of the doctoral study for a national conference.
- To network with colleagues at a global level.
- To establish strong communication and presentation skills.
- To evaluate own and others' presentations to enhance advocacy and communication skills.





# **NTU School of Engineering and Applied Science**

## **Master of Business Administration (High-Tech M.B.A.)**

The NTU School's Master of Business Administration (High-Tech M.B.A.) program is designed to teach engineers, scientists, and computer professionals “the business of business,” in diverse areas ranging from accounting to organizational behavior—preparing them to be leaders in today's technology-based businesses. The program, through unique case studies and coursework that relate to the rapidly changing world of electronics and computers, provides students the opportunity to learn about the analytical, technical, and behavioral tools that are used to address management challenges typical of technology-based businesses. It also emphasizes the people skills that are often neglected in technical programs.

The High-Tech M.B.A. program is intended to meet the needs of a broad and unique population of working technical managers and supervisors. The core courses emphasize the needs and skills sets of engineers and technical professionals and include these threads to further develop students' business skills:

- Change Management
- Communication and Collaboration
- Networking
- Constituency Awareness
- Decision-Making
- Ethics
- Managing Distance

### **Specializations**

- Business Process Management
- Emerging Technologies
- Engineering Innovation
- Global Product Management
- Information Strategies
- Technology Project Management

### **Degree Requirements**

- 36 semester credits
- Core courses (18 sem. cr.)
- Specialization courses (12 sem. cr.)
- Specialized elective courses (6 sem. cr.)

# Curriculum

The High-Tech M.B.A. is a 36-semester-credit program. Students complete a core set of six courses that provide a foundation in the theories and concepts relevant to business and management. Then, four specialization courses build on the core content and emphasize an area that meets students' more specific needs and goals. Finally, each of the specializations includes a list of suggested electives from which students choose at least two courses to complete their degree requirements.

*Note: Former NTU course numbers are shown below in parentheses for reference purposes only; students register using the Walden course numbers.*

## Core Curriculum (18 sem. cr.)

NMBA 6120 (*NB 720*) Organizational Behavior: Working Within the Equations of State (3 sem. cr.)

NMBA 6130 (*NB 721*) Leadership and Teamwork: Accomplishing Momentum Transfer Using Power, Influence, and Collaboration (3 sem. cr.)

NMBA 6140 (*NB 740*) Strategy and Negotiation: Solving the Boundary Value Problem (3 sem. cr.)

NMBA 6150 (*NB 710*) Technology and Operations: Moore's Law and Other Business Accelerators (3 sem. cr.)

NMBA 6160 (*NB 730*) Marketing: Maximizing the Organizational I/O Bus (3 sem. cr.)

NMBA 6170 (*NB 750*) Finance and Accounting: Measurement and Flow Control for the Economic Engine (3 sem. cr.)

## Specialized Curriculum (18 sem. cr.)

### *Business Process Management Specialization*

There is no business or technical process that cannot be improved. With off-shoring so prevalent, today's virtual manufacturers must engineer processes rather than the plant itself. With today's virtual companies, management must now focus a great deal on business processes, functions carried out in a defined order to accomplish a task. Today's M.B.A. graduates are in positions that require knowledge and skills related to continued process improvement and management. The Business Process Management specialization is designed to help students become successful in such organizational environments.

### **Specialization Courses (12 sem. cr.)**

NMBA 6313 (*MG 723*) Supply Chain Management (3 sem. cr.)

NMBA 6341 (*SE 786*) Business Process Innovation (3 sem. cr.)

NMGT 8750 (*TO 750*) Total Quality Management and Improvement (3 sem. cr.)

NSYS 6120 (*SY 720*) Systems Engineering and Analysis (3 sem. cr.)

### **Elective Courses (6 sem. cr.)**

*Students select any two additional graduate-level NTU courses. The following are suggestions:*

NMBA 6336 (*MG 726*) Global Competitive Environment (3 sem. cr.)

NMBA 6351 (*MG 770*) Legal Environment of Business (3 sem. cr.)

NMGT 8510 (*QM 710*) Operations Research Models (3 sem. cr.)

NSYS 6140 (*SY 540*) Systems Optimization and Analysis (3 sem. cr.)

## ***Emerging Technologies Specialization***

The pressure to transform organizations from both process and product standpoints continues to be driven by advances in technology that increase and expand at an ever more rapid pace. The Emerging Technologies specialization is designed to help students identify new opportunities in technology, as well as the strategic management, marketing, and utilization of technology. Students examine the global business environment and legal aspects of business, including intellectual property. Ultimately, this specialization, in combination with the M.B.A. core, enables students to develop the knowledge and skills they need to create a strategic business vision that accelerates the incorporation of new technologies and provides competitive advantage.

### **Specialization Courses (12 sem. cr.)**

NMBA 6336 (*MG 726*) Global Competitive Environment (3 sem. cr.)  
NMBA 6351 (*MG 770*) Legal Environment of Business (3 sem. cr.)  
NMBA 8750 (*MB 713*) Analysis of Emerging Technologies (3 sem. cr.)  
NMGT 8735 (*TO 735*) Marketing of Advanced Technologies (3 sem. cr.)

### **Elective Courses (6 sem. cr.)**

*Students select any two additional graduate-level NTU courses. The following are suggestions:*

NMBA 6313 (*MG 723*) Supply Chain Management (3 sem. cr.)  
NMBA 6910 Inventions, Innovations and the Entrepreneurial Spirit (3 sem. cr.)  
NMGT 6235 (*EF 735*) Economic Decision Analysis (3 sem. cr.)  
NSYS 6163 (*SY 563*) Integrated Risk Management (3 sem. cr.)

## ***Engineering Innovation Specialization***

An organization's level of innovation and creativity is recognized as directly related to its value. To be competitive in today's global marketplace, companies are forced to continually innovate and reinvent themselves, their products, and their processes. This climate requires organizations to institutionalize the process of innovation and creativity. When done right, this can transform a business. Students who complete the Engineering Innovation specialization will be prepared to lead their organizations to achieve outstanding innovative results.

### **Specialization Courses (12 sem. cr.)**

NMBA 6336 (*MG 726*) Global Competitive Environment (3 sem. cr.)  
NMBA 6910 Inventions, Innovations and the Entrepreneurial Spirit (3 sem. cr.)  
NMBA 8750 (*MB 713*) Analysis of Emerging Technologies (3 sem. cr.)  
NSYS 6163 (*SY 563*) Integrated Risk Management (3 sem. cr.)

### **Elective Courses (6 sem. cr.)**

*Students select any two additional graduate-level NTU courses. The following are suggestions:*

NMBA 6313 (*MG 723*) Supply Chain Management (3 sem. cr.)  
NMBA 6341 (*SE 786*) Business Process Innovation (3 sem. cr.)  
NMBA 6351 (*MG 770*) Legal Environment of Business (3 sem. cr.)  
NMGT 6235 (*EF 735*) Economic Decision Analysis (3 sem. cr.)  
NMGT 8750 (*TO 750*) Total Quality Management and Improvement (3 sem. cr.)  
NSPP 6325 (*PD 525*) Integrated Design and Manufacturing (3 sem. cr.)

## ***Global Product Management Specialization***

Product management began in the early 1930s and has emerged as the dominant concept in product deployment. Today's product managers must have broad knowledge of almost all aspects of the

organization, including knowledge of global sourcing and marketing. Product managers must also be skilled at working across departments, with many types of teams, to build coalitions. Essentially, product managers operate a business within a business. The Global Product Management specialization enables students to develop the skills they need to be successful in this area.

**Specialization Courses (12 sem. cr.)**

NMBA 6152 Product Management and the Age of Brands (3 sem. cr.)  
NMBA 6313 (*MG 723*) Supply Chain Management (3 sem. cr.)  
NMBA 6336 (*MG 726*) Global Competitive Environment (3 sem. cr.)  
NMGT 8735 (*TO 735*) Marketing of Advanced Technologies (3 sem. cr.)

**Elective Courses (6 sem. cr.)**

*Students select any two additional graduate-level NTU courses. The following are suggestions:*

NMBA 6351 (*MG 770*) Legal Environment of Business (3 sem. cr.)  
NMBA 8750 (*MB 713*) Analysis of Emerging Technologies (3 sem. cr.)  
NMGT 6760 (*TO 760*) Introduction to Project Management (3 sem. cr.)  
NSPP 6325 (*PD 525*) Integrated Design and Manufacturing (3 sem. cr.)  
NSYS 6163 (*SY 563*) Integrated Risk Management (3 sem. cr.)

***Information Strategies Specialization***

Information technology (IT) permits fundamental changes within an organization and the way its processes must radically change to take advantage of the latest technologies. To make such transformations successful, managers need to have the appropriate skills and knowledge in both business and IT. The Information Strategies specialization provides students the opportunity to emphasize content specific to information and software systems.

**Specialization Courses (12 sem. cr.)**

NCSC 6401 (*CS 750*) Database Management Systems (3 sem. cr.)  
NSEI 6711 (*SE 787*) Management of Information Systems (3 sem. cr.)  
NSEN 6511 (*SE 785*) Software Project Management (3 sem. cr.)  
NSEN 6571 (*SE 792*) Software Acquisition Practices (3 sem. cr.)

**Elective Courses (6 sem. cr.)**

*Students select any two additional graduate-level NTU courses. The following are suggestions:*

NCSC 6461 (*CS 758*) Data Mining (3 sem. cr.)  
NCSC 6841 (*ST 760*) Computer and Network Security I (3 sem. cr.)  
NSEN 6251 (*SE 770*) Software Specification (3 sem. cr.)  
NSEN 6471 (*SE 760*) Software Quality Management (3 sem. cr.)

***Technology Project Management Specialization***

Project management is a crucial profit/loss driver for many businesses that develop technology. This specialization is designed for engineers, computer professionals, and technical professionals who want to strengthen their knowledge and skills in the project management body of knowledge.

**Specialization Courses (12 sem. cr.)**

NMBA 8762 (*NB 762*) Strategic Project Management (3 sem. cr.)  
NMGT 6760 (*TO 760*) Introduction to Project Management (3 sem. cr.)  
NMGT 6761 (*TO 761*) Advanced Project Management (3 sem. cr.)  
NSYS 6163 (*SY 563*) Integrated Risk Management (3 sem. cr.)

### **Elective Courses (6 sem. cr.)**

*Students select any two additional graduate-level NTU courses. The following are suggestions:*

NMBA 6313 (*MG 723*) Supply Chain Management (3 sem. cr.)

NMBA 6351 (*MG 770*) Legal Environment of Business (3 sem. cr.)

NMGT 6235 (*EF 735*) Economic Decision Analysis (3 sem. cr.)

NMGT 8750 (*TO 750*) Total Quality Management and Improvement (3 sem. cr.)

## **M.S. in Computer Engineering**

Computer engineers design computers and computer systems, apply computers as components of larger systems, and apply digital techniques to solve a broad range of engineering problems. The M.S. in Computer Engineering program prepares students to work in the dynamic and rapidly expanding field of digital technology.

### **Specializations**

- Computer Systems
- Digital Systems
- Networks
- Secure Computing

### **Degree Requirements**

- 31-32 semester credits
- Core courses (13-14 sem. cr.)
- Specialization courses (12 sem. cr.)
- Elective courses (6 sem. cr.)

### **Curriculum**

The M.S. in Computer Engineering is a 31-32-semester-credit program consisting of four core courses, four specialization courses, and two elective courses. The curriculum features a substantial choice of specialization and elective courses, thereby enabling students to tailor the program of study to meet their specific needs and fulfill their particular aspirations. The advanced portion of the curriculum remains open-ended to encourage students to take advantage of new courses that concentrate on the latest developments in the field.

*Note: Former NTU course numbers are shown below in parentheses for reference purposes only; students register using the Walden course numbers.*

## Core Curriculum (13-14 sem. cr.)

The core curriculum consists of four courses and allows students to develop knowledge across a broad spectrum of topics related to computer engineering. Students should complete the core courses prior to pursuing specialization and elective courses. (Core courses not chosen to satisfy the core requirement may be taken as part of the specializations.)

NEEP 6111 (CA 714) Computer Architecture (4 sem. cr.)

NSEN 6001 (SE 710) Software Engineering (3 sem. cr.)

*Students select one of the following:*

NCSC 6101 (CS 740) Operating Systems Principles (3 sem. cr.)

NCSC 6333 (ST 759) Data Communication Networks (3 sem. cr.)

*Students select one of the following:*

NEEI 6341 (IC 541) Introduction to Digital Integrated Circuits (4 sem. cr.)

NEEP 6221 (DS 510) Digital ASIC Design (3 sem. cr.)

## Specialized Curriculum (12 sem. cr.)

Students select at least four courses from a specialization that represents the technical emphasis most compatible with their educational and career goals. Students should consult an advisor or visit [www.ntu.edu](http://www.ntu.edu) for information about currently offered specialization areas and courses. Core courses not chosen to satisfy the core requirement may be taken as part of the specializations. *Note: The courses listed in the specialization categories below are recommendations—not requirements. Students are free to substitute other specialization courses within the Computer Engineering program.*

### ***Computer Systems Specialization***

Many different types of computers are used in technical and business applications. The Computer Systems specialization is concerned with the design of those computers. Students learn about advanced computer architectures and operating systems, embedded computer systems, the design of computer clusters, and other related areas. Suggested courses include the following:

NCSC 6031 (CA 720) Introduction to Parallel Computing (3 sem. cr.)

NCSC 6331 (CA 722) Computer Networks I (3 sem. cr.)

NCSC 6332 (CC 784) Computer Networks II (3 sem. cr.)

NCSC 6831 (CS 765) Distributed Computing Systems (3 sem. cr.)

NCSC 8101 Advanced Operating Systems (3 sem. cr.)

NEEI 6315 (IC 752) Computer-Aided Engineering for Integrated Circuits (3 sem. cr.)

NEEP 6164 Embedded Computer Systems (3 sem. cr.)

NEEP 6165 (CA 765) Real-Time Computer Systems (3 sem. cr.)

NEEP 6181 (DS 780) Fault-Tolerant Systems (3 sem. cr.)

NEEP 6271 (DS 770) Testing and Diagnosis of VLSI Systems (3 sem. cr.)

NEEP 8111 Advanced Computer Architectures (3 sem. cr.)

NEEP 8221 Advanced Digital Design (3 sem. cr.)

### ***Digital Systems Specialization***

Digital circuits and systems form an essential part of many consumer, commercial, and industrial products. The Digital Systems specialization enables students to learn about the design and testing of digital circuits and circuit systems used in a variety of applications. Suggested courses include the following:

NEEC 6551 (*CC 560*) Digital Signal Processing I (3 sem. cr.)  
NEEC 6556 (*CC 760*) Analog and Digital Filter Design (3 sem. cr.)  
NEEC 6557 (*CC 764*) VLSI Signal Processing (3 sem. cr.)  
NEEI 6315 (*IC 752*) Computer-Aided Engineering for Integrated Circuits (3 sem. cr.)  
NEEI 6342 (*IC 742*) Advanced Digital Integrated Circuits (3 sem. cr.)  
NEEI 6351 (*IC 776*) Analysis and Design of VLSI Analog-Digital Interface Integrated Circuits (3 sem. cr.)  
NEEP 6271 (*DS 770*) Testing and Diagnosis of VLSI Systems (3 sem. cr.)  
NEEP 8221 Advanced Digital Design (3 sem. cr.)  
NMTH 6751 (*MA 731*) Statistical Design of Experiments (3 sem. cr.)

### ***Networks Specialization***

Computer networks are such an integral element of the information economy that most businesses would be unable to function without them. The Networks specialization educates students in the design and performance of computer networks, as well as the principles and techniques used to provide secure transmission of data and to ensure the security of computers connected to networks. Suggested courses include the following:

NCSC 6041 (*ST 765*) Cryptography (3 sem. cr.)  
NCSC 6321 (*ST 754*) Internet Protocols (3 sem. cr.)  
NCSC 6331 (*CA 722*) Computer Networks I (3 sem. cr.)  
NCSC 6332 (*CC 784*) Computer Networks II (3 sem. cr.)  
NCSC 6831 (*CS 765*) Distributed Computing Systems (3 sem. cr.)  
NCSC 6841 (*ST 760*) Computer and Network Security I (3 sem. cr.)  
NCSC 6842 Computer and Network Security II (3 sem. cr.)  
NEEC 6501 (*CC 714*) Random Processes for Engineering Applications (3 sem. cr.)  
NEEC 6511 Network Design, Modeling, and Simulation (3 sem. cr.)  
NEEC 6525 (*CC 718*) Wireless Networks (3 sem. cr.)  
NEEC 6571 (*CC 740*) Error-Correcting Codes (3 sem. cr.)  
NEEC 6575 (*CC 745*) Information Theory (3 sem. cr.)  
NMTH 6751 (*MA 731*) Statistical Design of Experiments (3 sem. cr.)

### ***Secure Computing Specialization***

Computers and networks resistant to unauthorized intrusion or sabotage can be obtained only if security is made an inherent part of the design and construction. The Secure Computing specialization educates students about possible security imperfections in computers and networks, as well as the principles and techniques used in building software that is inherently resistant to interference. Suggested courses include the following:

NCSC 6041 (*ST 765*) Cryptography (3 sem. cr.)  
NCSC 6331 (*CA 722*) Computer Networks I (3 sem. cr.)  
NCSC 6332 (*CC 784*) Computer Networks II (3 sem. cr.)  
NCSC 6841 (*ST 760*) Computer and Network Security I (3 sem. cr.)



NCSC 6842 Computer and Network Security II (3 sem. cr.)  
NCSC 6843 Information Assurance (3 sem. cr.)  
NCSC 8081 Quantum Computation (3 sem. cr.)  
NCSC 8101 Advanced Operating Systems (3 sem. cr.)  
NCSC 8841 Advanced Security Techniques for Information Networks (3 sem. cr.)  
NEEC 6571 (*CC 740*) Error-Correcting Codes (3 sem. cr.)  
NEEP 6181 (*DS 780*) Fault-Tolerant Systems (3 sem. cr.)  
NEEP 8111 Advanced Computer Architectures (3 sem. cr.)  
NEEP 8221 Advanced Digital Design (3 sem. cr.)  
NSEN 6341 Secure Software Development (3 sem. cr.)  
NSEN 8341 Software Immunization (3 sem. cr.)

## **Elective Courses (6 sem. cr.)**

Students select two elective courses from any of the NTU School's graduate-level courses to meet the elective requirement and to bring their total credits to a minimum of 31. Elective courses are designed to give students the opportunity to tailor the program to their individual and organizational goals and needs. Students are encouraged to consult with an academic advisor to select appropriate elective courses.

### ***Thesis Option***

Most students pursue a non-thesis degree program; however, when a thesis is determined desirable and appropriate by the student, in consultation with his or her academic advisor, a thesis may be substituted for six credits of coursework. For additional information about the thesis option, students should consult their advisor.

## **Foundation Courses**

Foundation courses are available for those students who do not have adequate preparation to begin the master's program. Foundation courses for students entering graduate study in Computer Engineering are available in topical areas. Please see [www.ntu.edu](http://www.ntu.edu) for a current list of Foundation courses.

# **M.S. in Computer Science**

Computer science is the body of knowledge dealing with the design, analysis, implementation, efficiency, and application of algorithmic processes that transform information. It deals with software, operating systems, programming languages, and other related areas.

## **Specializations**

- Algorithms and Complexity
- Artificial Intelligence
- Computer Systems
- Data Management
- Networks
- Secure Computing
- Simulation and Game Design
- Web Applications

# Degree Requirements

- 30 semester credits
- Core courses (12 sem. cr.)
- Specialization courses (12 sem. cr.)
- Elective courses (6 sem. cr.)

## Curriculum

The M.S. in Computer Science is a 30-semester-credit program, consisting of core courses, specialization courses, and elective courses. The curriculum features a substantial choice of specialization and elective courses, thereby enabling students to tailor the program to meet their specific needs and fulfill their particular aspirations. The advanced portion of the curriculum remains open-ended to encourage students to take advantage of new courses that concentrate on the latest developments in the field.

*Note: Former NTU course numbers are shown below in parentheses for reference purposes only; students register using the Walden course numbers.*

### Core Curriculum (12 sem. cr.)

The core curriculum consists of four courses and allows students to develop knowledge across a broad spectrum of topics related to computer science. Students select courses from a specified set of courses covering data structures, algorithms, programming languages, databases, and software engineering. Students should complete the core courses prior to pursuing specialization and elective courses. (Core courses not chosen to satisfy the core requirement may be taken as part of the specializations.)

*Students select at least one of the following:*

- NCSC 6021 (AD 720) Analysis of Algorithms (3 sem. cr.)
- NCSC 8011 (AD 711) Advanced Data Structures (3 sem. cr.)

*Students select the remaining core courses from the following:*

- NCSC 6101 (CS 740) Operating Systems Principles (3 sem. cr.)
- NCSC 6121 (CS 720) Programming Language Principles (3 sem. cr.)
- NCSC 6401 (CS 750) Database Management Systems (3 sem. cr.)
- NSEN 6001 (SE 710) Software Engineering (3 sem. cr.)

### Specialized Curriculum (12 sem. cr.)

Students select at least four courses from an area of specialization that represents the technical emphasis most compatible with their educational and career goals. Students should consult an advisor or visit [www.ntu.edu](http://www.ntu.edu) for information about currently offered specialization areas and courses. *Note: The courses listed in the specialization categories below are recommendations—not requirements. Students are free to substitute other specialization courses within the Computer Science program.*

### ***Algorithms and Complexity Specialization***

The study and development of algorithms are at the heart of computer science. Students specializing in this area learn about theoretical aspects of algorithm design, as well as the design of algorithms to solve problems in a variety of application areas. Suggested courses include the following:

NCSC 6002 Computability and Complexity (3 sem. cr.)  
NCSC 6025 (*AD 726*) Genetic Algorithms (3 sem. cr.)  
NCSC 6031 (*CA 720*) Introduction to Parallel Computing (3 sem. cr.)  
NCSC 6461 (*CS 758*) Data Mining (3 sem. cr.)  
NCSC 6531 Pattern Recognition (3 sem. cr.)  
NCSC 6571 (*IS 794*) Machine Learning (3 sem. cr.)  
NCSC 6581 (*IS 773*) Neural Computation (3 sem. cr.)  
NCSC 8021 Parallel and Combinatorial Algorithms (3 sem. cr.)  
NCSC 8071 Computational Biology (3 sem. cr.)

### ***Artificial Intelligence Specialization***

The ultimate goal of artificial intelligence (AI) research is to develop machines capable of thinking in a manner similar to (or better than) humans. Though researchers are still working toward that goal, other applications of AI pervade modern technology. From systems that can provide expert diagnoses and recommendations in a variety of application domains (such as medicine and finance) to systems that can modify their behavior based on learning (such as computer games and intelligent controllers for household appliances), AI techniques are an integral part of modern product design. Students selecting this specialization can study foundational AI material, as well as the use of AI techniques in several areas. Suggested courses include the following:

NCSC 6461 (*CS 758*) Data Mining (3 sem. cr.)  
NCSC 6501 (*IS 710*) Artificial Intelligence I (3 sem. cr.)  
NCSC 6506 (*IS 720*) Knowledge System Engineering (3 sem. cr.)  
NCSC 6521 Expert Systems (3 sem. cr.)  
NCSC 6526 (*IS 755*) Artificial Agents (3 sem. cr.)  
NCSC 6531 Pattern Recognition (3 sem. cr.)  
NCSC 6541 Natural Language Processing (3 sem. cr.)  
NCSC 6551 (*CT 780*) Robotics (3 sem. cr.)  
NCSC 6561 Computer Vision (3 sem. cr.)  
NCSC 6571 (*IS 794*) Machine Learning (3 sem. cr.)  
NCSC 6581 (*IS 773*) Neural Computation (3 sem. cr.)  
NMTH 6501 Decision Theory and Game Theory (3 sem. cr.)

### ***Computer Systems Specialization***

Computer systems includes computer architecture, operating systems, and compilers, which together provide the virtual machine supporting all computer applications. Students in the Computer Systems specialization study material that forms the foundation on which application software is built. Suggested courses include the following:

NCSC 6161 Compilers (3 sem. cr.)  
NCSC 6211 (*CM 740*) Numerical Analysis (3 sem. cr.)  
NCSC 6431 (*CS 755*) Distributed Database Systems (3 sem. cr.)  
NCSC 6441 Information Retrieval (3 sem. cr.)  
NCSC 6831 (*CS 765*) Distributed Computing Systems (3 sem. cr.)

NCSC 6834 Grid Computing (3 sem. cr.)  
NCSC 6837 Pervasive Computing (3 sem. cr.)  
NCSC 8081 Quantum Computation (3 sem. cr.)  
NCSC 8101 Advanced Operating Systems (3 sem. cr.)  
NEEP 6181 (*DS 780*) Fault-Tolerant Systems (3 sem. cr.)

### ***Data Management Specialization***

The organization and management of information is one of the key application areas in computer science. The Data Management specialization offers students an opportunity to learn about databases, information retrieval, information security, and distributed collection and storage of data. Suggested courses include the following:

NCSC 6402 Database Architectures and Design (3 sem. cr.)  
NCSC 6431 (*CS 755*) Distributed Database Systems (3 sem. cr.)  
NCSC 6441 Information Retrieval (3 sem. cr.)  
NCSC 6461 (*CS 758*) Data Mining (3 sem. cr.)  
NCSC 6506 (*IS 720*) Knowledge System Engineering (3 sem. cr.)  
NCSC 6531 Pattern Recognition (3 sem. cr.)  
NCSC 6831 (*CS 765*) Distributed Computing Systems (3 sem. cr.)  
NCSC 6837 Pervasive Computing (3 sem. cr.)  
NCSC 6841 (*ST 760*) Computer and Network Security I (3 sem. cr.)  
NCSC 6843 Information Assurance (3 sem. cr.)  
NCSC 8401 Advanced Database Systems (3 sem. cr.)  
NCSC 8841 Advanced Security Techniques for Information Networks (3 sem. cr.)

### ***Networks Specialization***

Computer networks are such an integral element of the information economy that most businesses would be unable to function effectively without them. The Networks specialization educates students in the design and performance of computer networks, as well as the principles and techniques used to provide secure transmission of data and to ensure the security of computers connected to the networks. Suggested courses include the following:

NCSC 6321 (*ST 754*) Internet Protocols (3 sem. cr.)  
NCSC 6331 (*CA 722*) Computer Networks I (3 sem. cr.)  
NCSC 6332 (*CC 784*) Computer Networks II (3 sem. cr.)  
NCSC 6333 (*ST 759*) Data Communication Networks (3 sem. cr.)  
NCSC 6831 (*CS 765*) Distributed Computing Systems (3 sem. cr.)  
NCSC 6837 Pervasive Computing (3 sem. cr.)  
NCSC 6841 (*ST 760*) Computer and Network Security I (3 sem. cr.)  
NCSC 6842 Computer and Network Security II (3 sem. cr.)  
NCSC 8841 Advanced Security Techniques for Information Networks (3 sem. cr.)

### ***Secure Computing Specialization***

Computers and networks resistant to unauthorized intrusion or sabotage can be obtained only if security is made an inherent part of the design and construction. The Secure Computing specialization educates students about possible security imperfections in computers and networks, as well as the principles and techniques used in building software that is inherently resistant to interference. Suggested courses include the following:

NCSC 6041 (*ST 765*) Cryptography (3 sem. cr.)  
NCSC 6331 (*CA 722*) Computer Networks I (3 sem. cr.)  
NCSC 6332 (*CC 784*) Computer Networks II (3 sem. cr.)  
NCSC 6841 (*ST 760*) Computer and Network Security I (3 sem. cr.)  
NCSC 6842 Computer and Network Security II (3 sem. cr.)  
NCSC 6843 Information Assurance (3 sem. cr.)  
NCSC 8081 Quantum Computation (3 sem. cr.)  
NCSC 8101 Advanced Operating Systems (3 sem. cr.)  
NCSC 8841 Advanced Security Techniques for Information Networks (3 sem. cr.)  
NEEC 6571 (*CC 740*) Error-Correcting Codes (3 sem. cr.)  
NEEP 6111 (*CA 714*) Computer Architecture (4 sem. cr.)  
NEEP 6181 (*DS 780*) Fault-Tolerant Systems (3 sem. cr.)  
NEEP 8111 Advanced Computer Architectures (3 sem. cr.)  
NSEN 6341 Secure Software Development (3 sem. cr.)  
NSEN 6411 (*SE 750*) Software Unit and Integration Testing (3 sem. cr.)  
NSEN 6421 (*SE 759*) Software System Level Testing (3 sem. cr.)  
NSEN 8341 Software Immunization (3 sem. cr.)

### ***Simulation and Game Design Specialization***

Simulations are used in both civilian and military applications to provide training and explore novel scenarios. Computer and video games form one of the largest sectors of the entertainment industry, surpassing the film sector in total revenues. The development of simulations and games utilizes knowledge from several areas of computer science and software engineering. This specialization enables students to work on the development of simulation and game systems. Suggested courses include the following:

NCSC 6501 (*IS 710*) Artificial Intelligence I (3 sem. cr.)  
NCSC 6511 Artificial Life (3 sem. cr.)  
NCSC 6521 Expert Systems (3 sem. cr.)  
NCSC 6526 (*IS 755*) Artificial Agents (3 sem. cr.)  
NCSC 6581 (*IS 773*) Neural Computation (3 sem. cr.)  
NCSC 6601 Human-Computer Interaction (3 sem. cr.)  
NCSC 6621 User Interface Design (3 sem. cr.)  
NCSC 6701 (*ST 540*) Computer Graphics I (3 sem. cr.)  
NCSC 6702 (*ST 741*) Computer Graphics II (3 sem. cr.)  
NCSC 6811 (*ST 731*) Simulation and Modeling (3 sem. cr.)  
NMTH 6501 Decision Theory and Game Theory (3 sem. cr.)  
NSEN 6301 (*SE 730*) Object-Oriented Analysis and Design (3 sem. cr.)  
NSEN 6331 (*SE 746*) Embedded Systems Software Development (3 sem. cr.)  
NSEN 6333 (*ST 720*) Real-Time Systems Software Development (3 sem. cr.)  
NSEN 6411 (*SE 750*) Software Unit and Integration Testing (3 sem. cr.)  
NSEN 6851 Computer Game Design I (3 sem. cr.)  
NSEN 6852 Computer Game Design II (3 sem. cr.)

### ***Web Applications Specialization***

The World Wide Web has become an integral part of how people live today. The Web is used by consumers to carry out transactions on their bank accounts and by large corporations to conduct trade and financial transactions. A mind-boggling array of other applications is easily available, and the number of Web-based applications continues to grow at an exponential rate. This diversity of Web functionality is made possible by a combination of networks and distributed hardware and software

systems. Students in the Web Applications specialization can take courses in a number of areas such as distributed computing, database technologies, and information security. Suggested courses include the following:

NCSC 6321 (*ST 754*) Internet Protocols (3 sem. cr.)  
NCSC 6431 (*CS 755*) Distributed Database Systems (3 sem. cr.)  
NCSC 6601 Human Computer Interaction (3 sem. cr.)  
NCSC 6621 User Interface Design (3 sem. cr.)  
NCSC 6831 (*CS 765*) Distributed Computing Systems (3 sem. cr.)  
NCSC 6837 Pervasive Computing (3 sem. cr.)  
NCSC 6841 (*ST 760*) Computer and Network Security I (3 sem. cr.)  
NCSC 6842 Computer and Network Security II (3 sem. cr.)  
NCSC 6843 Information Assurance (3 sem. cr.)  
NCSC 8841 Advanced Security Techniques for Information Networks (3 sem. cr.)  
NSEI 6731 (*CS 760*) Client-Server Computing (3 sem. cr.)  
NSEN 6341 Secure Software Development (3 sem. cr.)  
NSEN 6811 Internet Software Technologies I (3 sem. cr.)  
NSEN 6812 Internet Software Technologies II (3 sem. cr.)

## **Elective Courses (6 sem. cr.)**

Students select two elective courses from any of the NTU School's graduate-level courses to meet the elective requirement and bring their total credits to a minimum of 30. Elective credits are designed to give students the opportunity to tailor the program to their individual and organizational goals and needs. Students are encouraged to consult with an academic advisor to select appropriate elective courses.

### ***Thesis Option***

Most students pursue a non-thesis degree program; however, when a thesis is determined desirable and appropriate by the student, in consultation with his or her academic advisor, a thesis may be substituted for six credits of coursework. For additional information about the thesis option and guidelines, students should consult their advisor.

## **Foundation Courses**

Foundation courses are available for those students who do not have an adequate preparation to begin the master's program. Foundation courses for students entering graduate study in Computer Science are available in topical areas. Please see [www.ntu.edu](http://www.ntu.edu) for a current list of Foundation courses.

# M.S. in Electrical Engineering

The M.S. in Electrical Engineering program is designed to provide students with the technical background for the analysis, design, development, operation, or research of electrical or electronic systems.

## Tracks and Specializations

- Communications Track
  - Communication Networks
  - Data Communications
  - Secure Computing
  - Signal Processing
  - Wireless Communications
- Integrated Circuits Track
  - Analog Integrated Circuits
  - Digital Integrated Circuits
  - Integrated Circuits for Communications
  - Nanotechnology
- Microelectronics and Semiconductors Track
  - IC Fabrication and Characterization
  - Nanotechnology
  - Semiconductor Physics and Devices

## Degree Requirements

- 33 semester credits
- Core courses (9 sem. cr.)
- Specialization courses (18 sem. cr.)
- Elective courses (6 sem. cr.)

## Curriculum

The M.S. in Electrical Engineering is a 33-semester-credit program that features three tracks and several specializations, thereby enabling students to customize programs to meet their specific needs and fulfill their particular aspirations. Each track within the Electrical Engineering program has its own core courses and specializations.

The core curriculum consists of three courses to help students develop knowledge in topics basic to that specialized area of electrical engineering. Students should complete these courses prior to pursuing the specialization and elective courses. (Core courses not chosen to satisfy the core requirement may be taken as part of the specializations.) Students select six courses from an area specialization that represents the technical emphasis most compatible with their educational or career goals. Students complete the program with any two NTU School graduate-level electives. Students should consult an advisor or visit [www.ntu.edu](http://www.ntu.edu) for information about currently offered specializations and courses available in the three tracks.

*Note: Former NTU course numbers are shown below in parentheses for reference purposes only; students register using the Walden course numbers.*

## **Specialized Curriculum (27 sem. cr.)**

### ***Communications Track***

The Communications track prepares students to work on a wide variety of communications applications ranging from cell phones to the Internet. This track also provides education in the area of signal processing, which has many applications, such as eliminating noise from voice telecommunications, improving the sound quality of music recordings, and improving the clarity of satellite photographs.

#### **Core Courses (9 sem. cr.)**

NEEC 6501 (*CC 714*) Random Processes for Engineering Applications (3 sem. cr.)

NEEC 6521 (*CC 511*) Communication Systems I (3 sem. cr.)

NEEC 6551 (*CC 560*) Digital Signal Processing I (3 sem. cr.)

#### **Specialization Courses (18 sem. cr.)**

##### ***Communication Networks Specialization***

The Communication Networks specialization provides information about the structures and operations of networks used for analog or digital communications, information coding, detection of signals, modeling, and technology of network elements. Suggested courses include the following:

NCSC 6331 (*CA 722*) Computer Networks I (3 sem. cr.)

NCSC 6332 (*CC 784*) Computer Networks II (3 sem. cr.)

NEEC 6505 (*CC 731*) Estimation Theory (3 sem. cr.)

NEEC 6511 Network Design, Modeling, and Simulation (3 sem. cr.)

NEEC 6522 (*CC 715*) Communications Systems II (3 sem. cr.)

NEEC 6571 (*CC 740*) Error-Correcting Codes (3 sem. cr.)

NEEC 6575 (*CC 745*) Information Theory (3 sem. cr.)

NEEC 6605 (*EM 715*) Optical Detectors and Detector Systems (3 sem. cr.)

NEEC 6635 (*EM 513*) Fiber Communications and Systems (3 sem. cr.)

NEEC 6711 (*CT 712*) Linear Systems Theory (3 sem. cr.)

##### ***Data Communications Specialization***

The Data Communications specialization deals primarily with the transmission and security of data in networks used to connect computers. Students can learn about data communication protocols, packet traffic, coding and compression of data, network technologies, and security of network communications. Suggested courses include the following:

NCSC 6041 (*ST 765*) Cryptography (3 sem. cr.)

NCSC 6321 (*ST 754*) Internet Protocols (3 sem. cr.)

NCSC 6331 (*CA 722*) Computer Networks I (3 sem. cr.)

NCSC 6332 (*CC 784*) Computer Networks II (3 sem. cr.)

NCSC 6333 (*ST 759*) Data Communication Networks (3 sem. cr.)

NCSC 6841 (*ST 760*) Computer and Network Security I (3 sem. cr.)

NCSC 6842 Computer and Network Security II (3 sem. cr.)

NCSC 8841 Advanced Security Techniques for Information Networks (3 sem. cr.)

NEEC 6505 (*CC 731*) Estimation Theory (3 sem. cr.)

NEEC 6522 (*CC 715*) Communications Systems II (3 sem. cr.)

NEEC 6527 (*CC 781*) Spread Spectrum Systems (3 sem. cr.)



NEEC 6571 (*CC 740*) Error-Correcting Codes (3 sem. cr.)  
NEEC 6573 Data Compression (3 sem. cr.)  
NEEC 6575 (*CC 745*) Information Theory (3 sem. cr.)  
NEEC 6635 (*EM 513*) Fiber Communications and Systems (3 sem. cr.)

### ***Secure Computing Specialization***

Computer and information systems resistant to unauthorized intrusion or sabotage can be obtained only if security is made an inherent part of the design and construction of computers and communication networks. The Secure Computing specialization educates students about possible security imperfections in computers and networks, as well as the principles and techniques used in building systems that are inherently resistant to interference. Suggested courses include the following:

NCSC 6041 (*ST 765*) Cryptography (3 sem. cr.)  
NCSC 6331 (*CA 722*) Computer Networks I (3 sem. cr.)  
NCSC 6332 (*CC 784*) Computer Networks II (3 sem. cr.)  
NCSC 6841 (*ST 760*) Computer and Network Security I (3 sem. cr.)  
NCSC 6842 Computer and Network Security II (3 sem. cr.)  
NCSC 6843 Information Assurance (3 sem. cr.)  
NCSC 8081 Quantum Computation (3 sem. cr.)  
NCSC 8841 Advanced Security Techniques for Information Networks (3 sem. cr.)  
NEEC 6511 Network Design, Modeling, and Simulation (3 sem. cr.)  
NEEC 6522 (*CC 715*) Communications Systems II (3 sem. cr.)  
NEEC 6571 (*CC 740*) Error-Correcting Codes (3 sem. cr.)  
NEEC 6575 (*CC 745*) Information Theory (3 sem. cr.)

### ***Signal Processing Specialization***

The Signal Processing specialization focuses on the extraction of information from signals of various types. Students learn about filtering using digital and analog techniques, theories of signal manipulation, circuit and system designs for signal shaping and filtering, and the processing of signals comprising sounds and pictures. Suggested courses include the following:

NEEC 6505 (*CC 731*) Estimation Theory (3 sem. cr.)  
NEEC 6552 (*CC 763*) Digital Signal Processing II (3 sem. cr.)  
NEEC 6556 (*CC 760*) Analog and Digital Filter Design (3 sem. cr.)  
NEEC 6557 (*CC 764*) VLSI Signal Processing (3 sem. cr.)  
NEEC 6561 Digital Audio Processing (3 sem. cr.)  
NEEC 6565 Digital Image Processing (3 sem. cr.)  
NEEC 6571 (*CC 740*) Error-Correcting Codes (3 sem. cr.)  
NEEC 6573 Data Compression (3 sem. cr.)  
NEEC 6575 (*CC 745*) Information Theory (3 sem. cr.)  
NEEC 8551 (*CC 766*) Adaptive Signal Processing (3 sem. cr.)

### ***Wireless Communications Specialization***

The Wireless Communications specialization allows students to focus on the theories and technologies utilized in the transmission of signals via free-space propagation of radio waves. Suggested courses include the following:

NEEC 6366 (*EM 736*) Active Microwave Circuits (3 sem. cr.)  
NEEC 6505 (*CC 731*) Estimation Theory (3 sem. cr.)  
NEEC 6511 Network Design, Modeling, and Simulation (3 sem. cr.)  
NEEC 6522 (*CC 715*) Communications Systems II (3 sem. cr.)  
NEEC 6525 (*CC 718*) Wireless Networks (3 sem. cr.)

NEEC 6527 (*CC 781*) Spread Spectrum Systems (3 sem. cr.)  
NEEC 6571 (*CC 740*) Error-Correcting Codes (3 sem. cr.)  
NEEC 6575 (*CC 745*) Information Theory (3 sem. cr.)  
NEEC 6608 (*EM 732*) Microwave Devices and Circuits (3 sem. cr.)  
NEEC 6663 (*EM 735*) Microwave and RF Wireless Systems (3 sem. cr.)

### ***Integrated Circuits Track***

The Integrated Circuits track prepares electrical engineers to work on the design and testing of circuit chips used in machines that pervade practically every aspect of modern life, such as cell phones, wireless car keys, and computers.

#### **Core Courses (9 sem. cr.)**

NEEI 6301 (*IC 520*) Integrated Circuit Devices (3 sem. cr.)  
NEEI 6315 (*IC 752*) Computer-Aided Engineering for Integrated Circuits (3 sem. cr.)  
NEEI 6321 (*CR 526*) Analysis of Electronic Circuits (3 sem. cr.)

#### **Specialization Courses (18 sem. cr.)**

##### ***Analog Integrated Circuits Specialization***

The Analog Integrated Circuits specialization focuses on the design, simulation, and testing of circuit chips that work with signals that have levels varying in a continuous manner. Such circuits are used with sensors, in control systems, in audio systems, and in analog signal processing and filtering. Suggested courses include the following:

NEEC 6555 (*CR 551*) Analog Signal Processing and Filtering (3 sem. cr.)  
NEEC 6556 (*CC 760*) Analog and Digital Filter Design (3 sem. cr.)  
NEEC 6701 (*CT 520*) Feedback Control Systems (3 sem. cr.)  
NEEC 6711 (*CT 712*) Linear Systems Theory (3 sem. cr.)  
NEEI 6302 (*IC 724*) Principles and Characteristics of MOS Devices (4 sem. cr.)  
NEEI 6305 Heterostructure Devices (3 sem. cr.)  
NEEI 6331 (*IC 570*) Linear Integrated Circuits (4 sem. cr.)  
NEEI 6332 (*IC 771*) Advanced Analog Integrated Circuits (3 sem. cr.)  
NEEI 6351 (*IC 776*) Analysis and Design of VLSI Analog-Digital Interface Integrated Circuits (3 sem. cr.)  
NEEI 6371 (*IC 534*) Microelectronics Test Engineering (3 sem. cr.)  
NMTM 6751 (*MA 731*) Statistical Design of Experiments (3 sem. cr.)

##### ***Digital Integrated Circuits Specialization***

The Digital Integrated Circuits specialization deals with the design, simulation, and testing of circuits used to manipulate digital signals. Typical applications of such circuits are in computer chips and digital systems. Suggested courses include the following:

NEEI 6302 (*IC 724*) Principles and Characteristics of MOS Devices (4 sem. cr.)  
NEEI 6305 Heterostructure Devices (3 sem. cr.)  
NEEI 6341 (*IC 541*) Introduction to Digital Integrated Circuits (4 sem. cr.)  
NEEI 6342 (*IC 742*) Advanced Digital Integrated Circuits (3 sem. cr.)  
NEEI 6351 (*IC 776*) Analysis and Design of VLSI Analog-Digital Interface Integrated Circuits (3 sem. cr.)  
NEEI 6371 (*IC 534*) Microelectronics Test Engineering (3 sem. cr.)  
NEEP 6221 (*DS 510*) Digital ASIC Design (3 sem. cr.)  
NEEP 6271 (*DS 770*) Testing and Diagnosis of VLSI Systems (3 sem. cr.)





















































































































































































































































































































































































































































































