Department of Science, Technology, Engineering, and Mathematics (STEM) Education and Professional Studies

Web Site: http://www.odu.edu/stemps

Dr. Petros Katsioloudis, Department Chair
4101 Education Building
757-683-4305

The Department of Science, Technology, Engineering and Mathematics (STEM) Education and Professional Studies (STEMPS) is an academic leader in graduate studies related to education specialists, including career and technical education, instructional design and technology, marketing education, science education, mathematics education, technology education, STEM education, community college teaching, and business and industry training. It offers the M.S., M.S.Ed, and the Ph.D. in Education with programs in occupational and technical studies (OTS) and instructional design and technology (IDT). The Ed.S. is offered in conjunction with the educational leadership program. The department also offers licensure and teaching endorsement programs. Due to changing University requirements, national accreditation standards, and Commonwealth licensure regulations, the programs in the Darden College of Education are under constant revision. Any changes resulting from these factors supersede the program requirements described in the catalog. Students should obtain current program information from their advisors and the Darden College of Education website at http://education.odu.edu/.

Individual programs are described on the following pages.

Instructional Design and Technology Programs
- Master of Science in Education - Elementary Education – Instructional Design and Technology
- Master of Science in Education - Secondary Education – Instructional Design and Technology
- Doctor of Philosophy, Education - Instructional Design and Technology Concentration
- Graduate Certificate in Education and Training in Modeling and Simulation
- Graduate Certificate in Human Performance Technology

Mathematics and Science Education Programs
- Master of Science in Education with Mathematics Education Specialist Endorsement (PK-8)
- Master of Science in Education with Initial Licensure 6-12 - Mathematics
- Mathematics Education Specialist Endorsement (PK-8)
- Master of Science in Education with Initial Licensure - Secondary - Science
- Master of Science in Education for Licensed Teachers - Elementary – Science
- Master of Science in Education for Licensed Teachers - Secondary – Science

Occupational and Technical Studies Programs
- Master of Science - Occupational and Technical Studies, with concentrations in:
  - Business and Industry Training
  - Career and Technical Education Teaching (Available option for Technology Education Licensure)
  - Community College Teaching
  - Endorsement Program in Industrial Cooperative Training
  - Marketing Teacher Education with Licensure
  - Technology Education with Licensure
  - Education Specialist - Educational Leadership - Occupational and Technical Studies Concentration
  - Doctor of Philosophy - Education - Occupational and Technical Studies Concentration

Master of Science in Education - Elementary Education – Instructional Design and Technology Concentration

Jill Stefaniak, Program Coordinator

In the Master of Science in Education – Elementary-- instructional design and technology concentration, the core and support courses are combined, with students selecting 24 to 30 credits in instructional design and technology along with the problem paper or seminar research option. Working with an assigned advisor, students may take courses in the areas of distance education/telecommunications, instructional design and development, educational applications of instructional technology, and administration of instructional technology.

Admission
Students must:
1. hold a bachelor’s degree from a regionally accredited college/university;
2. have a cumulative undergraduate grade point average of 2.80;
3. take and receive satisfactory scores on either the Graduate Record Examination (score of 290 combined on verbal and quantitative with a minimum of 140 verbal for regular admission) or Miller Analogies Test (minimum score of 45 or 399 for regular admission); and
4. have an interview with the graduate program director or his/her designee.

Performance in classes taken as a non-degree graduate student will not be taken into consideration in the admission process. No courses in the undergraduate academic major or professional education in which the student has made below a C- will be accepted for licensure in the Darden College of Education.

Under certain circumstances, applicants who do not fully meet the requirements for regular admission to the program may be admitted on a provisional basis subject to conditions specified by the graduate program director for elementary/middle education.

Continuance
Students must:
1. maintain a grade point average of 3.00;
2. maintain a grade point average of 3.00 in the major.

All ID&T students are expected to have regular and reliable access to a multimedia computer (headphones, microphone, and web cam) and a high speed internet connection.

Exit
Students must:
1. have a 3.00 grade point average;
2. pass a written comprehensive examination;
3. have an exit interview;
4. have completed all course requirements; and
5. submit an application for graduation.
Program Requirements

All courses in the core and elective blocks are offered via synchronous and asynchronous format.

Paper Option: Area I (24 credits); Area II (6 credits); 30 credits total.
Seminar Option: Area I (30 credits); Area II (6 credits); 36 credits total.

Core Courses * 24-30

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDT 715</td>
<td>Management of Technology Resources in the Classroom</td>
</tr>
<tr>
<td>FOUN 840</td>
<td>Educational Measurement and Assessment</td>
</tr>
<tr>
<td>IDT 746</td>
<td>Foundations of Distance Education</td>
</tr>
<tr>
<td>IDT 749</td>
<td>Instructional Systems Design</td>
</tr>
<tr>
<td>IDT 761</td>
<td>Applied Instructional Design</td>
</tr>
<tr>
<td>IDT 775</td>
<td>Designing Online Instruction</td>
</tr>
<tr>
<td>TLED 617</td>
<td>Digital Age Teaching and Learning</td>
</tr>
<tr>
<td>TLCI 731</td>
<td>Instructional Technology Trends in Curriculum and Instruction</td>
</tr>
</tbody>
</table>

Support Courses

Graduate electives approved by the Graduate Program Director may be substituted for technology courses when those courses complement personal and professional goals.

Research Courses 6-12

<table>
<thead>
<tr>
<th>Option</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem Paper Option (6 credits; 30 credits required for graduation)</td>
<td></td>
</tr>
<tr>
<td>FOUN 612</td>
<td>Applied Research Methods in Education</td>
</tr>
<tr>
<td>SEPS 636</td>
<td>Problems in Occupational and Technical Studies</td>
</tr>
<tr>
<td>Seminar Option (13 credits; 37 credits required for graduation)</td>
<td></td>
</tr>
<tr>
<td>FOUN 612</td>
<td>Applied Research Methods in Education</td>
</tr>
<tr>
<td>IDT 773</td>
<td>Advanced Instructional Design Techniques</td>
</tr>
</tbody>
</table>

Electives

Total Hours 30-42

Master of Science in Education - Secondary Education – Instructional Design and Technology Concentration

Jill Stefaniak, Program Coordinator

The Master of Science in Education – Secondary - instructional design and technology concentration is designed to meet the needs of professionals interested or involved in the design, development, and delivery of instruction. The courses are appropriate for a variety of venues, including preK-12, higher education, military, and business. In this specialization, student’s select 24 to 30 credits in instructional design and technology plus the problems paper or seminar research option. Working with an advisor, students select courses that complement their backgrounds and professional goals.

Admission

Students must:

1. hold a bachelor’s degree from a regionally accredited college/university;
2. have a cumulative undergraduate grade point average of 2.80;
3. take and receive satisfactory scores on either the Graduate Record Examination (score of 290 combined on verbal and quantitative with a minimum of 140 verbal for regular admission) or Miller Analogies Test (minimum score of 45 or 399 for regular admission); and
4. have an interview with the graduate program director or his/her designee.

Performance in classes taken as a non-degree graduate student will not be taken into consideration in the admission process.

Continuance

Students must:

1. maintain a grade point average of 3.00;
2. maintain a grade point average of 3.00 in the major.

All ID&T students are expected to have regular and reliable access to a multimedia computer (headphones, microphone, and web cam) and a high speed internet connection.

Exit

Students must:

1. have a 3.00 grade point average;
2. pass a written comprehensive examination;
3. have an exit interview;
4. have completed all course requirements; and
5. submit an application for graduation.

Program Requirements

All courses in the core and elective blocks are offered via synchronous and asynchronous format.

Area I: Emphasis Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDT 617</td>
<td>Foundations of Instructional Technology (*)</td>
</tr>
<tr>
<td>IDT 749</td>
<td>Instructional Systems Design</td>
</tr>
</tbody>
</table>

Elective Courses * 18-24

<table>
<thead>
<tr>
<th>Area</th>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design (Select at least three courses)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IDT 725</td>
<td>Human Performance Assessment</td>
<td></td>
</tr>
<tr>
<td>IDT 742</td>
<td>Task Analysis Methods</td>
<td></td>
</tr>
<tr>
<td>IDT 748</td>
<td>Instructional Technology Product Evaluation</td>
<td></td>
</tr>
<tr>
<td>IDT 761</td>
<td>Applied Instructional Design</td>
<td></td>
</tr>
<tr>
<td>IDT 773</td>
<td>Advanced Instructional Design Techniques</td>
<td></td>
</tr>
</tbody>
</table>

| Technology (Select at least one course) |
| IDT 735 | Noninstructional Interventions |
| IDT 751 | Computer-Based Multi-Media Design |
| IDT 752 | Diffusion and Adoption of Instructional Technology Innovations |
| IDT 755 | Theory and Design of Instructional Simulation |
| IDT 756 | Instructional Gaming: Theories and Practice |
| IDT 775 | Designing Online Instruction |

| Human Performance Technology (Select at least one course) |
| IDT 730 | Principles and Practices of Human Performance Technology |
| IDT 737 | Consulting Skills for Instructional Designers |
| IDT 739 | Needs Analysis and Assessment |

Electives: From above, or from related areas (e.g., Modeling & Simulation, Psychology, Engineering, Speech-communications, Business, I/O Psychology) with approval of advisor and GPD

Area II: Research Core Courses Required

Problem Paper Option 6

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOUN 612</td>
<td>Applied Research Methods in Education</td>
</tr>
<tr>
<td>SEPS 636</td>
<td>Problems in Occupational and Technical Studies</td>
</tr>
</tbody>
</table>

Total Hours 30-36

Department of Science, Technology, Engineering, and Mathematics (STEM) Education and Professional Studies
Doctor of Philosophy - Education –
Instructional Design and Technology
Concentration
Jill Stefaniak, Program Coordinator

The Doctor of Philosophy in Education Instructional Design and Technology (ID&T) concentration prepares individuals to conduct research and assume leadership roles in the field of instructional technology. Students will master a number of instructional design skills, ranging from instructional problem identification, task and audience analysis, strategy design, assessment, evaluation, and implementation that they can use in a variety of settings including traditional classrooms, distance education, business, health care, military, K-12 and higher education, and government. Courses explore theories and research that provide a foundation for the field. Students are also expected to participate in and conduct research studies as part of their program. Completing the Ph.D. in ID&T will prepare students to take jobs as instructional design and human performance practitioners in business, military, government, health care, and educational settings. They are also prepared to take positions as faculty members in higher education and as researchers for private organizations.

Admission

For admission to this program, individuals should have completed master’s degree in an appropriate discipline from a regionally accredited university. Degrees that are equivalent to a master’s degree such as L.L.B., J.D., and D.D.S. are also acceptable. Prospective students should also have prior course work in statistics and instructional technology. If this requirement is not met, then additional course work may be added to the candidate’s graduate program of study at the discretion of the advisor and graduate program director. Please see prerequisites on the curriculum description for specifics.

Admission to the instructional design and technology Ph.D. program is competitive. A number of criteria are considered including graduate and undergraduate GPAs, GRE scores, writing ability, a personal interview, and the match between student interests and faculty expertise. Meeting the minimum requirements established by the department does not ensure admission to the program. A minimum undergraduate GPA of 2.8 and a minimum graduate GPA of 3.25 are recommended.

Application requirements for the Ph.D. in instructional design and technology are as follows:

1. a completed application which is available online or from the Office of Graduate Admissions.
2. Official transcripts of all undergraduate and graduate courses and degrees completed.
3. Official report scores from the Graduate Record Examination (verbal, quantitative, and analytical) taken within the last five years. GRE scores expire after five years; however, candidates who have completed the exam prior to five years before the application deadline may submit those scores for consideration if they are provided from an official source such as a transcript or form provided by the Educational Testing Service. Old Dominion University reserves the right to determine what is an “official source.”
4. Applicants whose native language is not English (or who do not have a B.S. or M.S. degree from an accredited institution in a country where English is the native language) must submit a current score for the Test of English as a Foreign Language (TOEFL) of at least 600 (written) or 250 (computer based).
5. Applicants must submit a 500 word statement of their academic and professional goals with an emphasis on how the Ph.D. degree in instructional design and technology will contribute to the achievement of the stated goals.
6. Three letters of reference from sources capable of commenting on the applicant’s readiness for advanced graduate study. It is recommended that at least two of the letters come from university faculty members. Other letters may come from work supervisors or managers.
7. An interview with the instructional design and technology program faculty. This committee will also review applications for admission.

Program Requirements

The Ph.D. program in Education with a concentration in instructional design and technology is comprised of courses totaling a minimum of 60 academic credit hours beyond the master’s degree. The curriculum includes an program core of 21 credit hours, 9 credit hours in the instructional design concentration, and a research core of 15 credit hours, the three credit dissertation seminar and the dissertation, which will include a minimum of 12 credit hours. The dissertation will often include more than 12 credit hours depending on the length of time necessary for completion. Students entering the program may also need to complete introductory statistics courses and an instructional technology foundations course if they have not had equivalent courses or cannot demonstrate competency at a satisfactory level. Students who enter the Ph.D. program with a master’s degree in an academic field that is unrelated to instructional design and technology and/or who have not completed courses to develop competency in specified areas may need to complete these courses in addition to the required courses. All courses are offered through distance learning. All students must complete the research residency project (IDT 879 and IDT 898) that results in a submission for publication or presentation to a nationally refereed journal or conference prior to taking comprehensive exams. The residency project must be completed within two years of the start of IDT 879. If not, the student must repeat IDT 879 without credit.

All IDT students are expected to have regular and reliable access to a multimedia computer (headphones, microphone, and web cam) and a high speed internet connection.

Under normal circumstances, admissions will be offered at least three times a year for the fall, spring, and summer semesters. Acceptance is competitive to assure that there is an adequate number of full-time faculty to serve the students through advising, mentoring, and other duties, particularly when individuals reach the dissertation stage of the program.

Students interested in attending full-time and applying for financial aid should submit their applications by February 1 prior to the fall semester they wish to start.

Applicants must submit completed applications and all related material no later than the following dates:

- May 1st for the Fall Semester
- November 1st for the Spring Semester
- March 1st for the Summer Semester

Program Continuance

After completing 12 hours in ID&T course work, students must maintain a 3.25 GPA in ID&T courses. Failure to do so will result in one year probation. If the student’s GPA in ID&T courses is less than 3.25 at the end of the probation period, the student will be suspended. Students who earn a grade of C+ or lower (including U) in a graduate course in their program of study are considered to be making unsatisfactory progress. Students earning one or more grades of C+ or lower must meet with the program director prior to enrolling in courses in future semesters. Students must provide a plan for making satisfactory progress or they will be suspended. If a student earns three or more grades of C+ or lower, they will be suspended from the program. Students wishing to be considered for reinstatement must follow the procedures set forth in the ODU Graduate Catalog.

In addition, the ODU Graduate Catalog states students who have less than a 3.0 GPA on courses at ODU will be placed on probation and may be suspended if conditions prescribed in the catalog are not met.

Continuous Enrollment and Exams

Doctoral students who do not meet the conditions for continuous enrollment and who do not have an approved leave of absence will be suspended from the degree program. Doctoral students who fail the comprehensive exam (either oral or written) or the doctoral final examination (e.g., dissertation defense) twice will be suspended from the degree program.
Satisfactory Progress

Doctoral students who do not complete at least 12 hours of course credits towards their degree each year with a grade of B- or higher prior to candidacy will be evaluated for continuation in the program. If the program faculty do not feel the student is making adequate progress, the student will be placed on program probation for one year. If the student has not completed 12 hours of course credits toward the degree with a grade of B- or higher, they will be suspended.

Research Residency and Dissertation

Doctoral students will be evaluated annually for their progress in completing their research residency or dissertation. Students who have not made progress towards the completion as demonstrated evidence of a finished proposal, data collection, data analysis, or drafts of the manuscript/dissertation will be evaluated by faculty for continuation in the program. If faculty feel the student has not made adequate progress, the student will be placed on probation for one year. If the student has not made adequate progress after one year of probation, faculty may recommend suspension from the program for failing to make adequate progress towards completion of the degree.

Plagiarism

Any student found guilty of plagiarism will be suspended immediately from the program.

Program Completion and Exit

To complete the program students must fully comply with the curriculum below and all requirements noted elsewhere in the University catalog for graduate students and within the Ph.D. in Education Handbook. It is the responsibility of the student to obtain these materials and complete required portions.

Curriculum

Prerequisites: All students admitted into the Ph.D. in instructional design and technology must complete the following prerequisite courses unless they have previously completed equivalent graduate level coursework or have appropriate educational experience.

<table>
<thead>
<tr>
<th>Prerequisites</th>
<th>ID &amp; T Core Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOUN 722 Introduction to Applied Statistics and Data Analysis</td>
<td>IDT 730/830 Principles and Practices of Human Performance Technology</td>
</tr>
<tr>
<td>IDT 617 Foundations of Instructional Technology</td>
<td>IDT 751/851 Computer-Based Multi-Media Design</td>
</tr>
<tr>
<td></td>
<td>IDT 760/860 Cognition and Instructional Design</td>
</tr>
<tr>
<td></td>
<td>IDT 773/873 Advanced Instructional Design Techniques</td>
</tr>
<tr>
<td></td>
<td>IDT 801 Instructional Design and Technology Seminar</td>
</tr>
<tr>
<td></td>
<td>IDT 810 Trends and Issues in Instructional Design and Technology</td>
</tr>
<tr>
<td></td>
<td>IDT 849 Instructional Systems Design</td>
</tr>
<tr>
<td></td>
<td>IDT 742/842 Task Analysis Methods</td>
</tr>
</tbody>
</table>

Research Core

| IDT 746/846 Foundations of Distance Education |
| IDT 748/848 Instructional Technology Product Evaluation |
| IDT 761/861 Applied Instructional Design |
| IDT 763/863 Instructional Design Theory |
| IDT 764/864 Theories and Research |
| IDT 898 Research Residency II |

Technology

| IDT 715/815 Management of Technology Resources in the Classroom |
| IDT 752/852 Diffusion and Adoption of Instructional Technology Innovations |
| IDT 755/855 Theory and Design of Instructional Simulation |
| IDT 756/856 Instructional Gaming: Theories and Practice |
| IDT 775/875 Designing Online Instruction |
| TLCI 735/835 Researching with Children: Contemporary Perspectives on the Child in Research |

Human Performance Technology

| IDT 735/835 Noninstructional Interventions |
| IDT 737/837 Consulting Skills for Instructional Designers |
| IDT 739/839 Needs Analysis and Assessment |

Electives **

Capstone Courses

| FOUN 881 Dissertation Seminar *** |
| SEPS 899 Dissertation in Occupational Education |

Total Hours 45

* All students admitted into the Ph.D. program in instructional design and technology must complete the prerequisite courses unless they have previously completed equivalent graduate level coursework or have appropriate educational experience.

** Electives are chosen from the list above, or from related areas, e.g., modeling & simulation, psychology, engineering, speech-communications, business, I/O psychology.

*** If seminar is waived by the doctoral committee, the credits are added to the content.

Additional courses or substitutions may be used as approved by student’s advisory committee.

Education and Training Emphasis in Modeling & Simulation Certificate

Ginger S. Watson, Program Coordinator

The College of Education offers a certificate in Modeling &Simulation through the Instructional Design and Technology program, a graduate-level program that is part of the STEM Education and Professional Studies Department.

Simulation and gaming are used extensively as teaching tools and training environments in a variety of education and training applications. The certificate provides the student with a fundamental understanding of modeling and simulation techniques coupled with targeted coursework in the design and use of simulation and gaming technologies for instructional settings. This certificate was the first of its kind in the U.S. and is a natural concentration area in instructional design and technology given the widespread use of simulation and gaming as instructional tools in Pre-K-12 education, colleges, universities, and corporate and military training programs. This certificate is one of several such certificate programs offered as part of the M&S strategic plan of Virginia Modeling, Analysis and Simulation Center (VMASC) and ODU.

The Modeling and Simulation Certificate Program consists of a minimum of four, three credit graduate courses. Courses include:

- FOUN 812 Research Design and Analysis
- FOUN 814 Qualitative Research Design in Education
- FOUN 823 Analysis of Variance Applied to Educational Research
- IDT 725/825 Human Performance Assessment
- IDT 879 Research Residency in Instructional Design and Technology
- TLCI 737/837 Human Performance Technology
- IDT 775/875 Designing Online Instruction
- TLCI 735/835 Researching with Children: Contemporary Perspectives on the Child in Research

Department of Science, Technology, Engineering, and Mathematics (STEM) Education and Professional Studies
Core Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSIM 601</td>
<td>Introduction to Modeling and Simulation</td>
<td>3</td>
</tr>
</tbody>
</table>

Related Elective Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDT 755/855</td>
<td>Theory and Design of Instructional Simulation</td>
<td>9</td>
</tr>
<tr>
<td>IDT 756/856</td>
<td>Instructional Gaming: Theories and Practice</td>
<td></td>
</tr>
<tr>
<td>SEPS 750/850</td>
<td>Trends and Issues in Training: Modeling and Simulation</td>
<td></td>
</tr>
</tbody>
</table>

Total Hours: 12

For more information about the Master of Science in Engineering modeling and simulation concentration, refer to the Catalog section for the Batten College of Engineering and Technology.

Graduate Certificate in Human Performance Technology

Human performance technology involves systematic and systemic approaches to identifying how work performance improvement can be measured, and most critically applied in real environments to solve actual problems. The certificate provides the student with a fundamental understanding of human technology coupled with targeted coursework in the design and implementation of instructional and non-instructional performance interventions to contribute to performance improvement, strategic planning, and organizational change initiatives. This certificate represents a synthesis in instructional design and technology with business education that benefits performance in a variety of organizations.

Graduate of the program will have the knowledge and skills to contribute to large scale projects that impact multiple facets of an organization. They will also be able to work on performance improvement initiatives.

Admission Requirements

Degree-seeking students may enroll in certificate courses with advisor's approval.

Non-degree seeking students seeking admission into the certificate program must:

- Submit a non-degree seeking-certificate/life learner application.
- Have an earned undergraduate degree from a regionally-accredited institution, or an equivalent degree from a foreign institution, with a GPA of 3.0 or higher.
- For those whose native language is not English, submit TOEFL scores with a minimum of 230 on the computer-based TOEFL or 80 on the TOEFL iBT.

Mathematics Content

- STEM 650 Differentiation of Mathematics Instruction for Diverse Student Populations
- STEM 660 Action Research for Mathematics Specialists
- STEM 661 Mathematics Specialists as Teacher Leaders
- STEM 662 Mathematical Assessment for Data Driven Decisions
- STEM 668 Internship for Mathematics Specialist

Electives

- STEM 535 Developing Instructional Strategies PreK-6: Mathematics
- STEM 555 Developing Instructional Strategies for Teaching in the Middle/High School: Mathematics

Curriculum

A minimum of 33 semester credits are required. The courses for completion of the degree program are listed below:

Education Content 15

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEM 650</td>
<td>Differentiation of Mathematics Instruction for Diverse Student Populations</td>
</tr>
<tr>
<td>STEM 660</td>
<td>Action Research for Mathematics Specialists</td>
</tr>
<tr>
<td>STEM 661</td>
<td>Mathematics Specialists as Teacher Leaders</td>
</tr>
<tr>
<td>STEM 662</td>
<td>Mathematical Assessment for Data Driven Decisions</td>
</tr>
<tr>
<td>STEM 668</td>
<td>Internship for Mathematics Specialist</td>
</tr>
</tbody>
</table>

Mathematics Content 15

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAPD 601</td>
<td>Number and Operations for PK-8 Mathematics Specialists</td>
</tr>
<tr>
<td>MAPD 602</td>
<td>Geometry and Measurement for PK-8 Mathematics Specialists</td>
</tr>
<tr>
<td>MAPD 603</td>
<td>Rational Numbers and Proportional Reasoning for PK-8 Mathematics Specialists</td>
</tr>
<tr>
<td>MAPD 604</td>
<td>Probability and Statistics for PK-8 Mathematics Specialists</td>
</tr>
<tr>
<td>MAPD 605</td>
<td>Algebra and Functions for PK-8 Mathematics Specialists</td>
</tr>
</tbody>
</table>

Electives 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEM 535</td>
<td>Developing Instructional Strategies PreK-6: Mathematics</td>
</tr>
<tr>
<td>STEM 555</td>
<td>Developing Instructional Strategies for Teaching in the Middle/High School: Mathematics</td>
</tr>
</tbody>
</table>

Total Hours: 33

Master of Science in Education - Elementary Education - with Mathematics Education Specialist Endorsement (PK-8)

This graduate program leads to a Master’s of Science in Education degree. Elementary major, with the Mathematics Specialist (PK-8) endorsement. This program is offered in partnership with the Department of Mathematics and Statistics in the College of Sciences.

Admission

Candidates must:

- Have 3 years of successful classroom experience in teaching mathematics;
- Hold a bachelor's degree from a regionally accredited college/university;
- Hold the Virginia Collegiate Professional License or an equivalent license from another state.
- Have an undergraduate grade point average of 2.80 and an average of 3.00 in the major;
- Achieve a satisfactory score (as established by the Department of Educational Curriculum and Instruction) on the Graduate Record Examination or the Miller Analogies Test; and
- Submit an application for graduate studies.

Performance in classes taken as a non-degree student will not be taken into consideration in the admission process. Under certain circumstances, applicants who do not fully meet the requirements for regular admission to the program may be admitted on a provisional basis subject to conditions specified by the graduate director for the program.

Continuance

Candidates must maintain a grade point average of 3.00.

Exit

Candidates must:

- Have a 3.00 grade point average;
- Have completed all course requirements;
- Have completed a professional learning portfolio; and
- Submit an application for graduation.

Total Hours: 33

Department of Science, Technology, Engineering, and Mathematics (STEM) Education and Professional Studies
Master of Science in Education with Initial Licensure 6-12 - Mathematics

There are a number of individuals who have earned B.S. or B.A. degrees who now want to obtain a master's degree leading to licensure as a secondary school teacher. In the program, students complete (or have completed) a minimum of 32 credits of undergraduate courses in one endorsement area (mathematics) and an additional 31-34 credits of education courses at the graduate level.

Students seeking this degree need to apply through the Department of Teaching and Learning.

Master of Science in Education with Initial Licensure 6-12 - Science

There are a number of individuals who have earned B.S. or B.A. degrees who now want to obtain a master’s degree leading to licensure as a secondary school teacher. In the program, students complete (or have completed) a minimum of 32 credits of undergraduate courses in one endorsement area (earth science, chemistry, biology, or physics) and an additional 31-34 credits of education courses at the graduate level.

Students seeking this degree need to apply through the Department of Teaching and Learning.

Mathematics Education Specialist Endorsement (PK-8)

This endorsement program leads to a Mathematics Specialist (PK-8) endorsement for individuals with a current Virginia license and a master's degree related to teaching elementary or middle school mathematics. This program is offered in partnership with the Department of Mathematics and Statistics in the College of Sciences.

Admission

Candidates must:

- Have 3 years of successful classroom experience in teaching mathematics;
- Hold a bachelor's degree from a regionally accredited college/university;
- Hold the Virginia Collegiate Professional License or an equivalent license from another state;
- Have an undergraduate grade point average of 2.80 and an average of 3.00 in the major;
- Achieve a satisfactory score (as established by the Department of Teaching and Learning) on the Graduate Record Examination or the Miller Analogies Test; and
- Submit an application for graduate studies.

Performance in classes taken as a non-degree student will not be taken into consideration in the admission process. Under certain circumstances, applicants who do not fully meet the requirements for regular admission to the program may be admitted on a provisional basis subject to conditions specified by the graduate director for the program.

Continuance

Candidates must maintain a grade point average of 3.00.

Exit

Candidates must:

- Have a 3.00 grade point average;
- Have completed all course requirements;
- Have completed a professional learning portfolio; and
- Submit an application for graduation.

Curriculum

A minimum of 21 semester credits are required. The courses for completion of the endorsement program are:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAPD 601</td>
<td>3</td>
</tr>
<tr>
<td>MAPD 602</td>
<td>3</td>
</tr>
<tr>
<td>MAPD 603</td>
<td>3</td>
</tr>
<tr>
<td>MAPD 604</td>
<td>3</td>
</tr>
<tr>
<td>MAPD 605</td>
<td>3</td>
</tr>
<tr>
<td>STEM 661</td>
<td>3</td>
</tr>
<tr>
<td>STEM 668</td>
<td>3</td>
</tr>
<tr>
<td>Total Hours</td>
<td>21</td>
</tr>
</tbody>
</table>

Master of Science - Occupational and Technical Studies

Philip Reed, Graduate Program Director

This is an advanced master’s degree and requires prior academic work associated with this area of study. The M.S. occupational and technical studies program has four concentrations - career and technical education, business and industry training, community college teaching, and STEM education. These studies are designed to help teachers and trainers upgrade their knowledge and skills and prepare for leadership roles in education and training. These programs are all delivered at the Norfolk campus and through the University’s distance learning system.

For Licensure to teach K-12 in Marketing Education and Technology Education please consult with the Graduate Program Director.

Admission

Students are admitted to the program on a continuing basis. Applications can be obtained from the Admissions Office, distance learning sites, the department and online. Students are admitted for fall, spring, and summer on a rolling basis. Graduate students can complete up to 12 graduate hours with a non-degree application. All applicants to the Master of Science degree in occupational and technical studies must meet University, college, and department requirements. In addition, all applicants must:

1. have an overall grade point average of 2.80 with a 3.00 in major courses,
2. complete all competencies listed on course syllabi;
3. complete the Graduate Record Examination (GRE) or the Miller Analogy Test and
4. submit two letters of recommendation.
5. submit a 500 word essay on how earning a M.S. in Occupational and Technical Studies contributes to the achievement of career goals.

Continuance

Students must:

1. maintain a minimum grade point average of 3.00.

Exit

Students in the career and technical education, business and industry training, and STEM education concentrations must complete 33 semester hours and students in the community college teaching concentration must complete 39 semester hours, as distributed in the M.S. curriculum. In addition, all students must:

1. achieve an overall grade point average of 3.00;
2. complete all competencies listed on course syllabi;
3. pass the written comprehensive examination; and
4. successfully complete a problems paper or thesis.

**Curriculum (33-39)**

<table>
<thead>
<tr>
<th>Common Core</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEPS 785 Curriculum Development in Occupational Education and Training</td>
<td></td>
</tr>
<tr>
<td>SEPS 788 Instructional Strategies for Innovation in Training and Occupational Education</td>
<td></td>
</tr>
<tr>
<td>SEPS 789 Instructional Technology in Education and Training</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Concentration Specific Courses</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select one specialization from the following:</td>
<td></td>
</tr>
<tr>
<td><strong>Career and Technical Education Teaching</strong></td>
<td></td>
</tr>
<tr>
<td>SEPS 760 Trends and Issues in Occupational Education</td>
<td></td>
</tr>
<tr>
<td>SEPS 762 Administration and Management of Education and Training Programs</td>
<td></td>
</tr>
<tr>
<td><strong>Business and Industry Training</strong></td>
<td></td>
</tr>
<tr>
<td>SEPS 761 Foundations of Adult Education and Training</td>
<td></td>
</tr>
<tr>
<td>SEPS 762 Administration and Management of Education and Training Programs</td>
<td></td>
</tr>
<tr>
<td><strong>Community College Teaching</strong></td>
<td></td>
</tr>
<tr>
<td>SEPS 760 Trends and Issues in Occupational Education</td>
<td></td>
</tr>
<tr>
<td>SEPS 761 Foundations of Adult Education and Training</td>
<td></td>
</tr>
<tr>
<td><strong>STEM Education</strong></td>
<td></td>
</tr>
<tr>
<td>STEM 720 STEM Educational Foundations</td>
<td></td>
</tr>
<tr>
<td>STEM 721 Science, Technology, Engineering, and Mathematics Connection and Integration</td>
<td></td>
</tr>
<tr>
<td><strong>Research Core</strong></td>
<td>6</td>
</tr>
<tr>
<td>FOUN 612 Applied Research Methods in Education</td>
<td></td>
</tr>
<tr>
<td>SEPS 636 Problems in Occupational and Technical Studies or SEPS 698 Thesis in Occupational Education</td>
<td></td>
</tr>
<tr>
<td><strong>Professional Technical Specialty</strong></td>
<td>12-18</td>
</tr>
<tr>
<td>Career and Technical Education (12 credits) *</td>
<td></td>
</tr>
<tr>
<td>Business and Industry Training (12 credits) *</td>
<td></td>
</tr>
<tr>
<td>Community College Teaching (18 credits) **</td>
<td></td>
</tr>
<tr>
<td>STEM Education (12 credits)</td>
<td></td>
</tr>
</tbody>
</table>

**Total Hours** 33-39

* Credits approved by advisor.

** Footnotes

** Doctor of Philosophy - Education – Occupational and Technical Studies Concentration

Philip Reed, Graduate Program Director

The Ph.D. in Education, occupational and technical studies concentration has three emphases: technology education, career and technical education, and human resources - training. The Ph.D. is delivered on campus and through the University’s distance learning system. All students must be on the Norfolk campus for two, two-week summer Institute sessions. The focus of the degree is to prepare university faculty, directors/supervisors of career and technical education, and directors of training departments in business, industry, and government.

The curriculum associated with Old Dominion University’s Ph.D. in Education, occupational and technical studies concentration is intended to accomplish the following learning outcomes:

- Individuals will apply knowledge, skills, and behaviors in today's complex educational and business environments.

- Every individual who completes this doctoral program, regardless of his/her concentration emphasis, will develop competencies for understanding and using research methods and statistics to make data-based driven decisions.

- The concentration emphasis will offer courses that enable graduates to know and apply their knowledge in today’s complex educational, business, or industry environments and emerge as leaders in their chosen careers.

Note for students concerning the Doctor of Philosophy in Education - Occupational and Technical Studies concentration: This program is not intended to lead to teacher certification or school leadership licensure. Teachers are advised to contact their individual school districts as to whether this program may qualify for teacher advancement.

**Admission**

Students may enroll in this program full- or part-time. The program faculty reviews all applicants as their application packages are completed. The following criteria are used for admittance:

1. graduate grade point average;
2. undergraduate grade point average;
3. Graduate Record Examination;
4. essay, 1500 word; and
5. goodness of fit with program goals, faculty expertise, and supporting references.

Graduate assistantships and fellowships may be available. Contact the graduate program director for information.

**Entrance**

All applicants to the Doctor of Philosophy degree, occupational and technical studies concentration, must meet University, college and department requirements. In addition, all applicants must:

1. hold a master’s degree related to this field or have worked in occupations related to the degree’s outcomes;
2. complete the graduate application with necessary fee;
3. submit an essay statement of academic and professional goals with an emphasis on how the Ph.D. in Education concentration in occupational and technical studies will contribute to the achievement of career goals;
4. submit three letters of reference from sources capable of commenting on readiness for advanced graduate study;
5. submit a resume that shows your educational and professional background;
6. submit academic transcripts from all undergraduate and graduate institutions previously attended or currently being attended with a minimum 3.00 graduate grade point average;
7. submit scores from the Graduate Record Examination that have been earned within the past five years;
8. if the applicant’s primary language is not English, submit a current score for the Test of English as a Foreign Language (TOEFL) that meets the University’s current standard.

Applications for admission are on a rolling basis. Graduate assistantships are awarded in February annually.

**Continuance**

Students must:

1. have their Ph.D. program approved;
2. successfully complete annual progress reviews;
3. meet faculty and University program expectations;
4. meet professional development and career preparation expectations.

**Exit**

Students must:

1. complete a minimum of 60 credit hours beyond the master’s degree;
2. complete all competencies listed on course syllabi;
3. achieve an overall grade point average of 3.00;
4. pass the written and oral comprehensive examination;
5. select a dissertation committee;
6. prepare and defend a dissertation prospectus;
7. successfully complete a dissertation with an oral defense; and
8. complete the graduate student University assessment.

Prerequisites
A master’s degree in an appropriate field related to this concentration is required for admission to the Ph.D. program. Students who do not have equivalent coursework or appropriate educational experiences must complete the following prerequisite courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOUN 612</td>
<td>Applied Research Methods in Education</td>
<td>3</td>
</tr>
<tr>
<td>FOUN 722</td>
<td>Introduction to Applied Statistics and Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>SEPS 785</td>
<td>Curriculum Development in Occupational Education and Training</td>
<td>3</td>
</tr>
<tr>
<td>SEPS 788</td>
<td>Instructional Strategies for Innovation in Training and Occupational Education</td>
<td>3</td>
</tr>
<tr>
<td>SEPS 789</td>
<td>Instructional Technology in Education and Training</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Hours 15

Curriculum (60 credits minimum)

Students in the occupational and technical studies concentration complete courses in research, core courses in occupational and technical studies concentration, and an emphasis in either career and technical education, human resources-training, or technology education, and 6 credit hours of electives.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEPS 835</td>
<td>Research Design for Occupational and Technical Studies</td>
</tr>
<tr>
<td>FOUN 812</td>
<td>Research Design and Analysis</td>
</tr>
<tr>
<td>FOUN 814</td>
<td>Qualitative Research Design in Education</td>
</tr>
<tr>
<td>FOUN 822</td>
<td>Applied Linear Models in Educational Research or FOUN 823 Analysis of Variance Applied to Educational Research</td>
</tr>
</tbody>
</table>

Concentration Core 18

Must be taken with one emphasis area—Technology Education, Career and Technical Education, or Human Resources-Training

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEPS 860</td>
<td>Trends and Issues in Occupational Education</td>
</tr>
<tr>
<td>SEPS 862</td>
<td>Administration and Management of Education and Training Programs</td>
</tr>
<tr>
<td>SEPS 865</td>
<td>Trends and Issues of Economic and Workforce Development</td>
</tr>
<tr>
<td>SEPS 885</td>
<td>Curriculum Development in Occupational Education and Training</td>
</tr>
<tr>
<td>SEPS 888</td>
<td>Instructional Strategies for Innovation in Training and Occupational Education</td>
</tr>
<tr>
<td>SEPS 889</td>
<td>Instructional Technology in Education and Training</td>
</tr>
</tbody>
</table>

Select one of the following Emphasis Areas 12

Technology Education Emphasis

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEPS 840</td>
<td>Readings in Occupational and Technical Studies</td>
</tr>
<tr>
<td>STEM 830</td>
<td>Introduction to Technology</td>
</tr>
<tr>
<td>STEM 831</td>
<td>Technical Systems</td>
</tr>
<tr>
<td>STEM 832</td>
<td>Program Development for Technology Education</td>
</tr>
</tbody>
</table>

Career and Technical Education Emphasis

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELS 626</td>
<td>Instructional Supervision, Staff Development, and Assessment</td>
</tr>
<tr>
<td>SEPS 840</td>
<td>Readings in Occupational and Technical Studies</td>
</tr>
<tr>
<td>SEPS 868</td>
<td>Internship</td>
</tr>
<tr>
<td>SEPS 887</td>
<td>Career and Technical Education Curriculum</td>
</tr>
</tbody>
</table>

Human Resources - Training Emphasis

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDT 846</td>
<td>Foundations of Distance Education</td>
</tr>
<tr>
<td>SEPS 840</td>
<td>Readings in Occupational and Technical Studies</td>
</tr>
<tr>
<td>SEPS 850</td>
<td>Trends and Issues in Training: Modeling and Simulation</td>
</tr>
<tr>
<td>SEPS 861</td>
<td>Foundations of Adult Education and Training</td>
</tr>
</tbody>
</table>

Electives 6

Electives are selected in consultation with the advisor. They should be planned and included in the student's program of study.

Capstone Courses 12-15

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOUN 881</td>
<td>Dissertation Seminar (if needed)</td>
</tr>
<tr>
<td>SEPS 899</td>
<td>Dissertation in Occupational Education</td>
</tr>
</tbody>
</table>

Total Hours 60-63

Endorsement Program in Industrial Cooperative Training

Philip Reed, Program Coordinator

The endorsement program in industrial cooperative training is designed to prepare a licensed teacher to be endorsed to teach industrial cooperative training in the public schools.

Admission

Students may enroll in this teaching endorsement program as a non-degree student. If an M.S. degree is sought, some graduate level courses may be applied toward professional technical studies in this component of the degree. Admission should be sought into the M.S. program in occupational and technical studies with a concentration in career and technical education teaching. Graduate students can complete up to 12 graduate hours with a non-degree application. Students should contact the program coordinator to discuss admissions options. Prior to entering this program, students must have or qualify for a Virginia Collegiate Professional or Postgraduate Professional License. Secondly, they must be interviewed and accepted by the program coordinator.

Continuance and Exit

Students must:

1. complete the following courses:
   - SEPS 401/501 Foundations of Career and Technical Education 3
   - SEPS 788 Instructional Strategies for Innovation in Training and Occupational Education 3
   - SEPS 508 Advanced Classroom Issues and Practices in Career and Technical Education 3
   - SEPS 408/508 Advanced Classroom Issues and Practices in Career and Technical Education 3
   - SEPS 450/550 Assessment, Evaluation and Improvement 3
   - SEPS 400 Instructional Systems Development 3
   - STEM 305 Curriculum for Technology Education 3
   - STEM 306 Methods for Technology Education 3
   - SEPS 503 Methods in Career and Technical Education 3

Total Hours 27
Continuation and Exit as well as to discuss course evaluation and options.

Twelve hours of 500/600 level courses may be applied toward the Master of Science in occupational and technical studies, career and technical education teaching concentration.

Marketing Teacher Education with Initial Licensure

Michael F. Kosloski, Program Coordinator

The post-baccalaureate endorsement in marketing education is designed to prepare a person who has a baccalaureate degree to be a marketing education teacher-coordinator. Participants who successfully complete this program will qualify to apply for a Virginia teaching license to teach marketing education.

Admission

For those students seeking licensure only, they must first apply to ODU as non-degree seeking. Students subsequently complete undergraduate or graduate level courses that meet Virginia licensure requirements. For students simultaneously seeking a graduate degree, they should apply for the graduate program and may take up to 12 credit hours that may be used toward both the M.S. and post-baccalaureate programs. Students should schedule an interview with the program coordinator for program admissions as well as to discuss course evaluation and options.

Continuation and Exit

Twelve hours of 500/600 level courses may be applied toward the Master of Science in occupational and technical studies, career and technical education teaching concentration.

Technology Education with Initial Licensure

Philip Reed, Graduate Program Director

The post-baccalaureate endorsement in technology education is designed to prepare a person who has a baccalaureate degree to be a technology education teacher. Participants who successfully complete this program will qualify to apply for a Virginia teaching license to teach technology education.

Admission

For those students seeking licensure only, they must first apply to ODU as non-degree seeking. Students subsequently complete undergraduate or graduate level courses that meet Virginia licensure requirements. For students simultaneously seeking a graduate degree, they should apply for the graduate program and may take up to 12 credit hours that may be used toward both the M.S. and post-baccalaureate programs. Students should schedule an interview with the program coordinator for program admissions as well as to discuss course evaluation and options.

Continuation and Exit

Students must:

1. complete the following courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Total Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEM 231</td>
<td>Communication Technology Processes</td>
<td>3</td>
</tr>
<tr>
<td>STEM 350</td>
<td>Communication Technology</td>
<td>3</td>
</tr>
<tr>
<td>STEM 351</td>
<td>Introduction to Technology</td>
<td>3</td>
</tr>
<tr>
<td>STEM 730</td>
<td>Technology Education</td>
<td>3</td>
</tr>
<tr>
<td>TLED 616</td>
<td>Design for Effective Instruction</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Hours: 46-48

2. earn a 2.75 cumulative grade point average on undergraduate level courses and a 3.00 cumulative grade point average at the graduate level, earn passing scores on Virginia Licensure Test before the teacher internship (see advisor or Teacher Education Services); and

3. complete the graduate student University assessment.

Complete this licensure program and other departmental requirements will allow the candidate to earn the Master of Science in occupational and technical studies, career and technical education teaching concentration.

Education Specialist - Educational Leadership - Occupational and Technical Studies Concentration

Philip Reed, Graduate Program Director

1. complete the following courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Total Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEM 320</td>
<td>Manufacturing and Construction Technology</td>
<td>3</td>
</tr>
<tr>
<td>STEM 350</td>
<td>Communication Technology</td>
<td>3</td>
</tr>
<tr>
<td>STEM 730</td>
<td>Introduction to Technology</td>
<td>3</td>
</tr>
<tr>
<td>TLED 616</td>
<td>Design for Effective Instruction</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Hours: 46-48

2. earn a 2.75 cumulative grade point average on undergraduate level courses and a 3.00 cumulative grade point average at the graduate level, earn passing scores on Virginia Licensure Test before the teacher internship (see advisor or Teacher Education Services); and

3. complete the graduate student University assessment.

Complete this licensure program and other departmental requirements will allow the candidate to earn the Master of Science in occupational and technical studies, career and technical education teaching concentration.
The Department of STEM Education and Professional Studies jointly offers the education specialist (Ed.S.) with the Department of Educational Foundations and Leadership. The program offers a cohesive sequence of academic studies designed to help graduates deal effectively with administrative problems encountered in urban schools and agencies. This program does not lead to K-12 school leadership licensure.

Admission
To be admitted to the Ed.S. program, an applicant must:
1. Hold a master’s degree in career and technical education or related field;
2. Have a successful experience as an administrator or teacher;
3. Hold a teaching license or equivalent; and
4. Have taken ELS 600 or its equivalent as a prerequisite.

Students seeking this degree need to apply through the Ed.S. program in the Department of Educational Leadership and Counseling.

Entrance
Students must:
1. meet all University requirements,
2. provide two letters of recommendation;
3. hold a master’s degree from an accredited institution (minimum 3.25 graduate grade point average),
4. provide a one-page essay explaining why he/she should be admitted to the program; and
5. have an acceptable score on the GRE or Miller Analogies Test.

Continuance
Students must meet all University requirements and maintain a 3.00 or higher grade point average.

Exit
Students must successfully complete:
1. a written comprehensive examination,
2. the required course of study, 
3. have a 3.00 grade point average or above, and
4. complete a university graduate student assessment.

Curriculum (33 credits)
Requirements for the Ed.S. with a specialty in occupational and technical studies include 30-33 semester hours (18 hours must be completed in 800-level courses in ELS), as follows:

Prerequisites *

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELS 610</td>
<td>School Community Relations and Politics</td>
<td>3</td>
</tr>
<tr>
<td>ELS 621</td>
<td>Curriculum Development and Assessment</td>
<td>3</td>
</tr>
<tr>
<td>ELS 657</td>
<td>Public School Law</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Hours: 9

Educational Leadership 18
<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELS 753</td>
<td>Educational Finance and Budgeting</td>
<td></td>
</tr>
<tr>
<td>ELS 854</td>
<td>Human Resource Development and Evaluation</td>
<td></td>
</tr>
<tr>
<td>ELS 871</td>
<td>Educational Systems Planning and Futures</td>
<td></td>
</tr>
<tr>
<td>ELS 876</td>
<td>Leadership for Social Justice</td>
<td></td>
</tr>
<tr>
<td>ELS 878</td>
<td>Leadership for Teaching and Learning</td>
<td></td>
</tr>
<tr>
<td>ELS 879</td>
<td>Field Research in School Administration and Supervision</td>
<td></td>
</tr>
</tbody>
</table>

Occupational and Technical Studies 15
<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEPS 860</td>
<td>Trends and Issues in Occupational Education</td>
<td></td>
</tr>
<tr>
<td>SEPS 862</td>
<td>Administration and Management of Education and Training Programs</td>
<td></td>
</tr>
</tbody>
</table>

Total Hours: 33

* ELS 610, ELS 621, and ELS 657 are prerequisites for the principalship endorsement.

** And/or other courses approved by the candidate's advisor.

INSTRUCTIONAL DESIGN AND TECHNOLOGY Courses

IDT 575. Web Development for Educators. 3 Credits.
Provides both a conceptual framework and hands-on experience in the design and development of online web resources for educators. The course introduces the student to the various uses and features of online tools and technologies, investigates online learning strategies, and explores best practices in the use of the web to enhance learning. Topics include fundamentals of web authoring; screen design, use of web page creation tools, and functional use of HTML and derivatives. Prerequisites: graduate standing.

IDT 617. Foundations of Instructional Technology. 3 Credits.
Required introductory overview to the field of instructional technology. Topics include a history of the field, basic instructional design, generally accepted theoretical practices and major formats of instructional media. Emphasis is given to instructional technology trends as applied to various industries, including K-12, military, industry training, and others.

IDT 630. Foundations of Human Performance Technology. 3 Credits.
This course will introduce students to the field of Human Performance Technology (HPT). Students will explore what HPT is, why instructional designers should know about it, how performance improvements can be measured, and most critically, how it can be applied in real environments to solve real problems. Students will gain practice in thinking systematically about performance, and they will enhance their value as instructional design professionals by being able to offer solutions to organizational needs that go beyond traditional instruction.

IDT 647. Online Learning. 3 Credits.
This course is an applied survey on online instruction, including relevant online learning theory and design considerations, as well as tools and principles, with an emphasis on K-12 education. Topics include theories and principles of online learning, effectively identifying, locating, evaluating, preparing, and using educational technology as instructional resources in an online environment.

IDT 715. Management of Technology Resources in the Classroom. 3 Credits.
Surveys computing technology with a focus on management in educational contexts. Implementation, integration and resourcing will be covered.

IDT 725. Human Performance Assessment. 3 Credits.
This course focuses on the theory, design, and evaluation of measurement instruments used to assess individual knowledge, performance, and attitudes. Topics include fundamentals of measurement, reliability, validity, and instrument selection, construction, and use. Students will develop and evaluate instruments for instructional and research purposes. Prerequisite: FOUN 722 or equivalent.

IDT 730. Principles and Practices of Human Performance Technology. 3 Credits.
This course explores both the principles and practices of human performance technology, with roughly equal emphasis on both. Students will learn what HPT is, how it's applied in practice, and how and why instructional designers need to know about it. Particular emphasis is given to determining whether or not problems are best amenable to instructional solutions.
IDT 735. Noninstructional Interventions. 3 Credits.
This project-based course examines several different non-instructional interventions that can be used to promote performance improvement. Major methodologies common in the field will be explored as a class, and students will also be required to familiarize themselves with other methodologies of their choice. Emphasis will be on the following interventions: job analysis/ work design, performance development, human resource development, organizational communication, organizational design and financial systems.

IDT 737. Consulting Skills for Instructional Designers. 3 Credits.
This project-based course is designed to develop and enhance the ability of instructional designers to work as partners and consultants to clients and superiors. The focus is on consulting skills per se, and not any particular content. All students will be required to do an individual consulting project, supervised by the instructor.

IDT 739. Needs Analysis and Assessment. 3 Credits.
Lecture, 3 hours; 3 credits. This project-based class will focus on the process of doing a needs analysis and assessment, from start to finish. Although theoretical considerations regarding needs analyses will be explored, the emphasis is on actually conducting the analysis. Students will work in teams under the supervision of the instructor to conduct a needs analysis for an external client.

IDT 742. Task Analysis Methods. 3 Credits.
This project-based course examines several different task analysis methodologies. Major methodologies common in the field will be explored as a class, and students will also be required to familiarize themselves with other methodologies of their choice. Emphasis will be on practical application of the methodologies, especially as regards instructional products or systems.

IDT 746. Foundations of Distance Education. 3 Credits.
An analysis of the trends, issues, and theories of distance education in education, business, and military applications. Students will examine various distance education systems, policies and lessons from different perspectives.

IDT 748. Instructional Technology Product Evaluation. 3 Credits.
Provides an overview to the science of evaluation, both as a general field and as applied to instruction. Topics will include evaluating the effectiveness of learning technologies; building survey instruments; online and computer-assisted testing; reporting practices; as well as formative, summative program and performance evaluation and assessment. The unique demands of evaluating mediated education and learning environments will be considered. Prerequisites: IDT 749 and IDT 849.

IDT 749. Instructional Systems Design. 3 Credits.
Students will gain hands-on experience applying a theoretical understanding of instructional design and development to actual projects. Students will learn and use the Instructional Systems Design Process from initial learner profile analysis to design and development through to evaluation. Students will work individually and in teams to gain experience similar to real-world instructional design situations. Students will master the fundamental practices upon which the instructional design process is based.

IDT 751. Computer-Based Multi-Media Design. 3 Credits.
This course covers the theory, design, and evaluation of computer-based multimedia instruction. Students will demonstrate a thorough understanding of instructional theory and design strategies for computer-based drills, tutorials, hypermedia, simulations, games, tools, open-ended learning environments, tests, and web-based instruction. Class projects will center on the design and development of instruction utilizing at least two of these methodologies. Prerequisites: IDT 749 and IDT 849.

IDT 752. Diffusion and Adoption of Instructional Technology Innovations. 3 Credits.
This course will explore theories, research, and strategies related to the diffusion and adoption of instructional technology innovations in education and training. The course will explore why and how individuals, groups, and organizations adopt or fail to adopt an innovation or change.

IDT 755. Theory and Design of Instructional Simulation. 3 Credits.
This course focuses on learning theory, design and evaluation of instructional simulations and simulators. Topics include history, instructional design, validation, and integration of instructional simulations.

IDT 756. Instructional Gaming: Theories and Practice. 3 Credits.
Provides both a conceptual framework and experience in the design and development of instructional games. The course introduces the student to the history, research, theory, and practice of instructional games. Topics include discussions of relevant learning theories associated with instructional gaming, analysis and design of games and current research in instructional gaming.

IDT 760. Cognition and Instructional Design. 3 Credits.
Students will be introduced to the theoretical frameworks that form the basis of instructional systems theory and design. Focus will be on learning theories, instructional psychology, and instructional systems theory. Recent developments in cognition, learning and instruction for educators will also be considered. Topics include perspectives of behaviorism, social-historical constructivism, cognitive science, situated cognition, and cultural influences on cognition.

IDT 761. Applied Instructional Design. 3 Credits.
Problem-based course in which students gain experience applying knowledge from IDT 749/849 to real-world instructional and instructional technology problems. Project work is individual, paired, and in teams. Students demonstrate mastery of the instructional design and development process through production of tools, technologies, media or materials that successfully resolve an instructional problem. Focus is on rapid prototyping model. Prerequisites: IDT 749 and IDT 849.

IDT 763. Instructional Design Theory. 3 Credits.
Students will investigate traditional and contemporary instructional design theories and models. Behavioral, cognitive, generative, problem-based learning, and constructivist theories as well as cognitive hierarchies will be examined, compared, contrasted and applied to various instructional situations.

IDT 764. Theories and Research. 3 Credits.
This course is a study of the application of perceptual and learning principles to the design of instructional media for use in educational and training applications. The focus is on the development and application of heuristics from the research literature. We will examine verbal and iconic signs as well as visual imagery, and their role in the instructional and learning processes.

IDT 773. Advanced Instructional Design Techniques. 3 Credits.
Exploration and application of techniques, tools and competencies characteristic of expert designers. Topics may include: instructional strategies, use of design software, program design, advanced analysis techniques, motivation design, rapid prototyping, reducing design cycle time, and designing instruction for diverse learner populations. Prerequisites: IDT 749/IDT 849.

IDT 775. Designing Online Instruction. 3 Credits.
An applied survey of online instruction, including relevant theory and design considerations. Topics include efficacy of online learning, design considerations when using course management systems and similar online learning technologies, research and future directions.

IDT 795. Topics in Instructional Design and Technology. 1-3 Credits.
Provides opportunities for master’s and doctoral students to explore topics related to instructional design.

IDT 801. Instructional Design and Technology Seminar. 3 Credits.
Introduces new Ph.D. students to the field of instructional design and technology and provides orientation to doctoral level study. The course includes reading, critiquing and analyzing empirical research, theories, and real-world instructional problems. Potential student research agendas consistent with faculty or programmatic research foci will be explored. Academic and technological expectations will be communicated and practiced.

IDT 810. Trends and Issues in Instructional Design and Technology. 3 Credits.
Exploration and discussion of trends and issues of current and historical significance to instructional design. Readings will include contributions of key scholars, past and present, in instructional design and related fields. Includes analysis of trends and issues to track and predict their impact on the future of the field. Prerequisite: 9 hours IDT coursework.
IDT 815. Management of Technology Resources in the Classroom. 3 Credits.
Surveys computing technology with a focus on management in educational contexts. Implementation, integration and resourcing will be covered.

IDT 825. Human Performance Assessment. 3 Credits.
This course focuses on the theory, design, and evaluation of measurement instruments used to assess individual knowledge, performance, and attitudes. Topics include fundamentals of measurement, reliability, validity, and instrument selection, construction, and use. Students will develop and evaluate instruments for instructional and research purposes. Prerequisite: FOUN 722 or equivalent.

IDT 830. Principles and Practices of Human Performance Technology. 3 Credits.
This course explores both the principles and practices of human performance technology, with roughly equal emphasis on both. Students will learn what HPT is, how it's applied in practice, and how and why instructional designers need to know about it. Particular emphasis is given to determining whether or not problems are best amenable to instructional solutions.

IDT 835. Noninstructional Interventions. 3 Credits.
This project-based course examines several different non-instructional interventions that can be used to promote performance improvement. Major methodologies common in the field will be explored as a class, and students will also be required to familiarize themselves with other methodologies of their choice. Emphasis will be on the following interventions: job analysis/ work design, performance development, human resource development, organizational communication, organizational design and financial systems.

IDT 837. Consulting Skills for Instructional Designers. 3 Credits.
This project-based course is designed to develop and enhance the ability of instructional designers to work as partners and consultants to clients and superiors. The focus is on consulting skills per se, and not any particular content. All students will be required to do an individual consulting project, supervised by the instructor.

IDT 839. Needs Analysis and Assessment. 3 Credits.
This project-based class will focus on the process of doing a needs analysis and assessment, from start to finish. Although theoretical considerations regarding needs analyses will be explored, the emphasis is on actually conducting the analysis. Students will work in teams under the supervision of the instructor to conduct a needs analysis for an external client.

IDT 842. Task Analysis Methods. 3 Credits.
This project-based course examines several different task analysis methodologies. Major methodologies common in the field will be explored as a class, and students will also be required to familiarize themselves with other methodologies of their choice. Emphasis will be on practical application of the methodologies, especially as regards instructional products or systems.

IDT 846. Foundations of Distance Education. 3 Credits.
An analysis of the trends, issues, and theories of distance education in education, business, and military applications. Students will examine various distance education systems, policies and lessons from different perspectives.

IDT 848. Instructional Technology Product Evaluation. 3 Credits.
Provides an overview to the science of evaluation, both as a general field and as applied to instruction. Topics will include evaluating the effectiveness of learning technologies; building survey instruments; online and computer-assisted testing; reporting practices; as well as formative, summative program and performance evaluation and assessment. The unique demands of evaluating mediated education and learning environments will be considered. Prerequisites: IDT 749 and IDT 849.

IDT 849. Instructional Systems Design. 3 Credits.
Students will gain hands-on experience applying a theoretical understanding of instructional design and development to actual projects. Students will learn and use the Instructional Systems Design Process from initial learner profile analysis to design and development through to evaluation. Students will work individually and in teams to gain experience similar to real-world instructional design situations. Students will master the fundamental practices upon which the instructional design process is based.

IDT 851. Computer-Based Multi-Media Design. 3 Credits.
This course covers the theory, design, and evaluation of computer-based multimedia instruction. Students will demonstrate a thorough understanding of instructional theory and design strategies for computer-based drills, tutorials, hypermedia, simulations, games, tools, open-ended learning environments, tests, and web-based instruction. Class projects will center on the design and development of instruction utilizing at least two of these methodologies. Prerequisites: IDT 749 and IDT 849.

IDT 852. Diffusion and Adoption of Instructional Technology Innovations. 3 Credits.
This course will explore theories, research, and strategies related to the diffusion and adoption of instructional technology innovations in education and training. The course will explore why and how individuals, groups, and organizations adopt or fail to adopt an innovation or change.

IDT 855. Theory and Design of Instructional Simulation. 3 Credits.
This course focuses on learning theory, design and evaluation of instructional simulations and simulators. Topics include history, instructional design, validation, and integration of instructional simulations.

IDT 856. Instructional Gaming: Theories and Practice. 3 Credits.
Provides both a conceptual framework and experience in the design and development of instructional games. The course introduces the student to the history, research, theory, and practice of instructional games. Topics include discussions of relevant learning theories associated with instructional gaming, analysis and design of games and current research in instructional gaming.

IDT 860. Cognition and Instructional Design. 3 Credits.
Students will be introduced to the theoretical frameworks that form the basis of instructional systems theory and design. Focus will be on learning theories, instructional psychology, and instructional system theory. Recent developments in cognition, learning and instruction for educators will also be considered. Topics include perspectives of behaviorism, social-historical constructivism, cognitive science, situated cognition, and cultural influences on cognition.

IDT 861. Applied Instructional Design. 3 Credits.
Problem-based course in which students gain experience applying knowledge from IDT 749/849 to real-world instructional and instructional technology problems. Project work is individual, paired, and in teams. Students demonstrate mastery of the instructional design and development process through production of tools, technologies, media or materials that successfully resolve an instructional problem. Focus is on rapid prototyping model. Prerequisites: IDT 749 and IDT 849.

IDT 863. Instructional Design Theory. 3 Credits.
Students will investigate traditional and contemporary instructional design theories and models. Behavioral, cognitive, generative, problem-based learning, and constructivist theories as well as cognitive hierarchies will be examined, compared, contrasted and applied to various instructional situations.

IDT 864. Theories and Research. 3 Credits.
This course is a study of the application of perceptual and learning principles to the design of instructional media for use in educational and training applications. The focus is on the development and application of heuristics from the research literature. We will examine verbal and iconic signs as well as visual imagery, and their role in the instructional and learning processes.

IDT 873. Advanced Instructional Design Techniques. 3 Credits.
Exploration and application of techniques, tools and competencies characteristic of expert designers. Topics may include: instructional strategies, use of design software, program design, advanced analysis techniques, motivation design, rapid prototyping, reducing design cycle time, and designing instruction for diverse learner populations. Prerequisites: IDT 749/IDT 849.

IDT 875. Designing Online Instruction. 3 Credits.
An applied survey of online instruction, including relevant theory and design considerations. Topics include efficacy of online learning, design considerations when using course management systems and similar online learning technologies, research and future directions.
IDT 879. Research Residency in Instructional Design and Technology. 3 Credits.
An introduction to conducting instructional technology research. Students will work in consultation with their advisor to develop a proposal for a study related to instructional technology as part of their research residency that will be submitted for presentation at a nationally refereed conference or to a refereed journal.

IDT 895. Topics in Instructional Design and Technology. 3 Credits.
Provides opportunities for master’s and doctoral students to explore topics related to instructional design.

IDT 898. Research Residency II. 1-3 Credits.
A mentored research project by the student’s advisor. Students work independently with their advisor to complete the research residency project. This course focuses on obtaining appropriate human subjects approval, collecting and analyzing data, and preparing a manuscript suitable for presentation or publication in nationally refereed journal or conference. Course may be repeated as needed, but only 3 hours may be counted toward degree requirements. Prerequisites: IDT 879.

MATH PEDAGOGY Courses

MAPD 601. Number and Operations for PK-8 Mathematics Specialists. 3 Credits.
This course will meet the requirements of students in the Master of Science in Education: PK-8 Mathematics Specialist Endorsement Program, and cannot be used for credit toward any degree offered by the Department of Mathematics and Statistics. The course introduces students to a number of topics in PK-8 mathematics and related pedagogical methods. Acknowledging that learning with understanding occurs through a process of establishing a solid knowledge base upon which to build, students will explore the many and varied ways in which PK-8 students may develop number sense. The focus will be upon the development of best practices for teaching mathematics. This requires that the student have knowledge of the content, use a variety of pedagogical approaches, and be able to select and utilize appropriate manipulatives and technological resources that will foster PK-8 student understanding.

MAPD 602. Geometry and Measurement for PK-8 Mathematics Specialists. 3 Credits.
This course will meet the requirements of students in the Master of Science in Education: PK-8 Mathematics Specialist Endorsement Program, and cannot be used for credit toward any degree offered by the Department of Mathematics and Statistics. The course introduces students to a number of topics in PK-8 mathematics and related pedagogical methods. Following a “concrete-to-abstract” developmental learning approach, students will explore the mathematical concepts of measurement and geometry in grades PK-8. Emphasis will be placed upon measurement and geometry content knowledge as well as the pedagogical knowledge specific to mathematics teaching and learning. Students will also learn to use appropriate technology.

MAPD 603. Rational Numbers and Proportional Reasoning for PK-8 Mathematics Specialists. 3 Credits.
This course will meet the requirements of students in the Master of Science in Education: PK-8 Mathematics Specialist Endorsement Program, and cannot be used for credit toward any degree offered by the Department of Mathematics and Statistics. The course introduces students to a number of topics in PK-8 mathematics and related pedagogical methods. It is designed to engage participants in constructing relational understanding between theoretical development of mathematics and students’ learning of mathematics in the content strands of rational numbers and proportional reasoning. Students will learn how to select and use manipulatives to connect the concrete phase of mathematical learning to the abstract, symbolic phase. Various technologies will be integrated throughout the course as tools to enhance teaching and student understanding.

MAPD 604. Probability and Statistics for PK-8 Mathematics Specialists. 3 Credits.
This course will meet the requirements of students in the Master of Science in Education: PK-8 Mathematics Specialist Endorsement Program, and cannot be used for credit toward any degree offered by the Department of Mathematics and Statistics. The course introduces students to a number of topics in PK-8 mathematics and related pedagogical methods. It will focus on the content and processes that support the PK-8 students’ learning of probability and statistics. Instruction will cover data collection, display, and analysis as well as the development of a fundamental understanding of probabilistic structures. These structures will be related to real world problem solving and hands-on activities. Technology will be integrated throughout the course to illustrate mathematical concepts, facilitate students exploration, and to make and test hypotheses.

MATH 605. Algebra and Functions for PK-8 Mathematics Specialists. 3 Credits.
This course will meet the requirements of students in the Master of Science in Education: PK-8 Mathematics Specialist Endorsement Program, and cannot be used for credit toward any degree offered by the Department of Mathematics and Statistics. The course introduces students to a number of topics in PK-8 mathematics and related pedagogical methods. It will focus on topics that are encountered by middle and high school students as they move from the particular and concrete thinking of school arithmetic to the abstract thinking associated with algebra. The main themes covered include algebraic reasoning, generalization, and justification together with patterns and functions. Various technologies will be integrated within the course content and used as tools to enhance students’ understanding of the concepts of algebra.

SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS EDUCATION Courses

STEM 533. Developing Instructional Strategies PreK-6: Mathematics. 3 Credits.
Following a theory into practice philosophy, students explore, develop, and use instructional strategies, materials, technologies, and activities to promote children’s development of attitudes, behaviors, and concepts in mathematics in grades PreK-6 in support of NCTM national instructional standards and the Virginia Standards of Learning. Prerequisites: TLED 617.

STEM 534. Developing Instructional Strategies PreK-6: Science. 3 Credits.
Following a theory into practice philosophy, students explore, develop, and use instructional strategies, materials, technologies, and activities to promote children’s development of attitudes, behaviors, and concepts in science in grades PreK-6 in support of AAAS national instructional standards and the Virginia Standards of Learning.

STEM 553. Developing Instructional Strategies for Teaching in the Middle/High School: Mathematics. 3 Credits.
Following a theory/research-into-practice philosophy, students explore, develop, and use instructional strategies, materials, technologies, and activities to promote the development of attitudes, behaviors, and concepts in mathematics, grades 6-12, in support of national instructional standards and the Virginia Standards of Learning; 35 hours of teaching practicum required. Corequisites: TLED 583. Prerequisites: TLED 617 or TLED 677, passing scores on PRAXIS I or equivalent SAT I scores as established by VA Board of Education, a criminal background check, acceptance into teacher education, grade requirement in the specific content area and professional education core, minimum major and overall GPA of at least 2.75; additional prerequisites for MCPT students are TLED 608 and TLED 616.
STEM 554. Developing Instructional Strategies for Teaching in the Middle/High School: Science. 3 Credits.
Following a theory/research-into-practice philosophy, students explore, develop, and use instructional strategies, materials, technologies, and activities to promote the development of attitudes, behaviors, and concepts in science, grades 6-12, informed by national instructional standards and the Virginia Standards of Learning; 35 hours of teaching practicum required. Prerequisites: TLED 617, or TLED 677, passing scores on PRAXIS I or equivalent SAT scores as established by VA Board of Education, a criminal background check, acceptance into teacher education, grade requirement in the specific content area and professional education core, minimum major and overall GPA of at least 2.75; additional prerequisites for MCTP students are TLED 608 and TLED 616.

STEM 571. Communication Industries. 3 Credits.
A course designed to provide career and technical education teachers, industrial technologists, counselors, and administrators an opportunity to observe and enhance their knowledge of representative communication industries from the local region. (qualifies as a CAP experience).

STEM 572. Construction Industries. 3 Credits.
A course designed to provide career and technical education teachers, industrial technologists, counselors, and administrators an opportunity to observe and enhance their knowledge of representative construction industries from the local region. (qualifies as a CAP experience).

STEM 573. Manufacturing Industries. 3 Credits.
A course designed to provide career and technical education teachers, industrial technologists, counselors, and administrators an opportunity to observe and enhance their knowledge of representative manufacturing industries from the local region. (qualifies as a CAP experience).

STEM 574. Service Industries. 3 Credits.
A course designed to provide career and technical education teachers, industrial technologists, counselors, and administrators an opportunity to observe and enhance their knowledge of representative service industries from the local region. (qualifies as a CAP experience).

STEM 575. Transportation Industries. 3 Credits.
A course designed to provide career and technical education teachers, industrial technologists, counselors, and administrators an opportunity to observe and enhance their knowledge of representative transportation industries from the local region. (qualifies as a CAP experience).

STEM 586. Middle School Student Teaching for Technology Education. 6 Credits.
Classroom placement for student teaching in a middle school technology laboratory. Students apply content and methodology under the supervision of a cooperating teacher and university faculty member. Available for pass/fail grading only. (qualifies as a CAP experience) Prerequisites: Passing scores on PRAXIS I or State Board of Education-approved SAT or ACT scores, passing scores on the appropriate PRAXIS II content examination, and SEPS 508, SEPS 596, SEPS 788, STEM 730, TLED 608, TLED 616, and READ 680.

STEM 595. Topics. 1-3 Credits.
The advanced study of selected topics designed to permit small groups of qualified students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly. These courses will appear in the course schedule.

STEM 651. Differentiation of Mathematics Instruction for Diverse Student Populations. 3 Credits.
Adapting the mathematics teaching and learning practices to accommodate diverse populations will be explored. The essential knowledge and understanding needed by mathematics specialists to assist classroom teachers in effectively utilizing differentiated instruction will be highlighted.

STEM 653. Mathematics in the Elementary/Middle School. 3 Credits.
Presents an overview of the content and structure of the various mathematics curricula. Methods of teaching mathematics in the elementary and middle school are introduced with special emphasis on technology in the mathematics classroom.

STEM 654. Science in the Elementary/Middle School. 3 Credits.
Current developments and educational research are applied to instructional methodology with an emphasis on hands-on activities in the school science curriculum.

STEM 655. Culturally Responsive Classroom. 3 Credits.
This course will focus on the following elements of effective teaching practice: understanding discipline specific content and methods, employing best-practice strategies to teach discipline specific skills and concepts, assessing student learning, legal and safety issues, use of technology, issues of diversity, engagement with the community, and strategies for continuing to grow as a teacher and learner.

STEM 660. Action Research for Mathematics Specialists. 3 Credits.
Action Research is introduced as a means to conduct classroom-based studies in the context of mathematics. The practical nature of research methods that mathematics specialists can use in conjunction with their mathematics instructional program is emphasized. Prerequisites: Departmental approval required.

STEM 661. Mathematics Specialists as Teacher Leaders. 3 Credits.
The critical characteristics and responsibilities of Mathematics Specialists as teacher leaders will be explored. Structuring classroom assistance through peer coaching, mentoring, observations and conferencing will be highlighted to expand the prospective Mathematics Specialists’ leadership capacity.

STEM 662. Mathematical Assessment for Data Driven Decisions. 3 Credits.
Selected key differences between assessment for and of learning will be examined as a means to provide rich descriptions of student learning. Designing and using quality assessment systems to inform instructional decisions and guide student learning will serve as a framework for Mathematics Specialists.

STEM 668. Internship for Mathematics Specialist. 3 Credits.
An internship experience that provides mathematics specialists an opportunity to develop the necessary knowledge, skills and dispositions to impact and improve the mathematics program of schools. Requires 150 hours of internship. Prerequisites: MATH 335.

STEM 720. STEM Educational Foundations. 3 Credits.
A multidisciplinary course designed to provide insights about the fundamental concepts and basis for STEM education programs. Standards for the school subjects of science, technology, engineering education and mathematics literacy will be reviewed. Connections between these subjects will be explored.

STEM 721. Science, Technology, Engineering, and Mathematics Connection and Integration. 3 Credits.
A course designed to teach how to plan integrated STEM curriculum and instructional materials. A review of projects that have undertaken STEM integration will be made. Students will learn how to map STEM content and then design STEM integrated curriculum and instructional materials. Prerequisite: STEM 720 or STEM 820.

STEM 730. Introduction to Technology. 3 Credits.
Order and structure the discipline of technology by identifying and analyzing the component parts and examining technical means as critical variables in the affairs of humankind. Based on the Standards for Technological Literacy.

STEM 731. Technical Systems. 3 Credits.
Analyze the technical concepts common and unique to the technical systems of technology.

STEM 732. Program Development for Technology Education. 3 Credits.
Plan and develop effective program in technology related activities. Focus is on identification and development of resources, activities, and materials for classroom programs.
STEM 795. Topics. 1-3 Credits.

STEM 820. STEM Educational Foundations. 3 Credits.
A multidisciplinary course designed to provide insights about the fundamental concepts and basis for STEM education programs. Standards for the school subjects of science, technology, engineering education and mathematics literacy will be reviewed. Connections between these subjects will be explored.

STEM 821. Science, Technology, Engineering, and Mathematics Connection and Integration. 3 Credits.
A course designed to teach how to plan integrated STEM curriculum and instructional materials. A review of projects that have undertaken STEM integration will be made. Students will learn how to map STEM content and then design STEM integrated curriculum and instructional materials. Prerequisite: STEM 720 or STEM 820.

STEM 830. Introduction to Technology. 3 Credits.
Order and structure the discipline of technology by identifying and analyzing the component parts and examining technical means as critical variables in the affairs of humankind. Based on the Standards for Technological Literacy.

STEM 831. Technical Systems. 3 Credits.
Analyze the technical concepts common and unique to the technical systems of technology.

STEM 832. Program Development for Technology Education. 3 Credits.
Plan and develop effective program in technology related activities. Focus is on identification and development of resources, activities, and materials for classroom programs.

STEM 895. Topics. 3 Credits.

STEM EDUCATION AND PROFESSIONAL STUDIES Courses

SEPS 500. Instructional Systems Development. 3 Credits.
Students learn how to design and develop classroom instructional materials including career and technical education and training curricula and programs for youths and adults. Skills in this area include the selection and use of materials, including media and computers and evaluation of pupil performance. Training specialist students learn to develop instructional materials using the instructional systems design process. Career and technical education students learn to plan instruction, to implement competency-based and standards-based education, and to modify and use the Virginia career and technical education curriculum guides.

SEPS 501. Foundations of Career and Technical Education. 3 Credits.
This course is designed to teach career and technical education majors to plan, develop, and administer a comprehensive program of career and technical education for high school students and adults. Students also develop an understanding of the historical and sociological foundations underlying the role, development and organization of public education in the United States.

SEPS 502. Instructional Methods in Occupational Studies. 3 Credits.
Designed to develop a student’s ability to use basic instructional techniques and methods applicable to career and technical education, and adults in business, government, and industrial organizations. It involves videotaped micro-teaching demonstrations.

SEPS 503. Methods in Career and Technical Education. 3 Credits.
A practical study and application of recommended methods of teaching career and technical education to high school students. Video-taped micro-teaching demonstrations are included. The course should be taken the semester prior to student teaching.

SEPS 508. Advanced Classroom Issues and Practices in Career and Technical Education. 3 Credits.
An overview of classroom issues and practices for prospective career and technical teachers. The course covers classroom management and safety, communication processes, reading in the content area and child abuse and neglect recognition and intervention. Students learn the legal requirements and alternative teaching strategies for serving students with special needs. Students visit schools for a 30-hour student observation. PRAXIS II completion is a course requirement. Prerequisites: junior standing and passing scores on PRAXIS I or State Board of Education-approved SAT or ACT scores.

SEPS 509. Fashion Forecasting Market Trip. 3 Credits.
This is the study of planning and conducting a fashion buying trip to one of the major fashion markets in the United States like the Las Vegas Magic Trade Show. The students envision themselves as buyers in action and learn how trend forecasting and creative presentations help market fashion products and services to trade customers and consumers.

SEPS 510. The Foreign Fashion Market Trip. 3 Credits.
Students plan and conduct a fashion buying trip to a foreign market in Europe or Asia, and learn how to buy merchandise in the global marketplace. The course requires students to go on the trip as well as attend the pre- and post-trip classes. Prerequisite: SEPS 208.

SEPS 511. Fashion Show Production. 3 Credits.
Students plan and produce a fashion show. They examine each behind-the-scenes step from concept to execution as they organize and stage a show that is profitable, entertaining, and aesthetically pleasing.

SEPS 523. Visual Merchandising and Display. 3 Credits.
This course is designed to introduce students to the best practices and effective strategies in visual merchandising. It will provide the basic framework with which prospective merchandisers plan and construct visual displays that enhance the selling of merchandise and ideas. Prerequisite: permission of the instructor.

SEPS 524. Fashion, Textiles, and Construction Analysis. 3 Credits.
This course explores information related to new technological advances in the textile/apparel industry and determines consumer preferences and concepts of fashion product quality. It includes the development of standards for judging qualities of merchandise. Fabrics are examined to determine the value they provide to the apparel and accessories customer. Prerequisite: permission of the instructor.

SEPS 530. Technology Applications in Training. 3 Credits.
This course is designed to prepare training professionals to plan and conduct training using technological applications. The course covers instructional technology skills, computer systems, and software that trainers need so that they can teach basic computer and information skills in business, industry and government.

SEPS 531. Web-Based Organization for Fashion. 3 Credits.
This course provides the basic communications foundations needed to conceive, plan, develop, implement, and maintain a Web-based organization for fashion. Upon completion, students will understand what is required to plan, launch and maintain a successful online venture, limited only by the willingness of the student to explore these technological advances.

SEPS 535. International Retailing. 3 Credits.
This course examines globalization and the development of an integrated global economy. Primary emphasis is placed on the strategies for successful global business expansion for retailers in international markets.

SEPS 540. Fashion Global Sourcing/Supply Chain Management. 3 Credits.
This course examines the role of global sourcing in the strategic positioning of retailers in the global economy. Emphasis is placed on economic, political, logistical, and ethical factors affecting world trade and global sourcing decisions.
SEPS 550. Assessment, Evaluation and Improvement. 3 Credits.
This course prepares training and educational professionals to plan for and conduct assessments to use in planning instructional programs, evaluate individual learning, monitor student progress, measure program effectiveness and efficiency, and evaluate the return on investments of training courses and programs.

SEPS 571. Communication Industries, 3 Credits.
A course designed to provide career and technical education teachers, industrial technologists, counselors, and administrators an opportunity to observe and enhance their knowledge of representative communication industries from the local region. (qualifies as a CAP experience) Prerequisite: junior standing and industrial technology major for 471.

SEPS 572. Construction Industries, 3 Credits.
A course designed to provide career and technical education teachers, industrial technologists, counselors, and administrators an opportunity to observe and enhance their knowledge of representative construction industries from the local region. (qualifies as a CAP experience) Prerequisite: junior standing and industrial technology major for 472.

SEPS 584. Student Teaching Mentored. 6-12 Credits.
Classroom placement in school systems for students to apply content and methodologies. The student is mentored by a school mentor and university faculty. This course is for newly hired teachers on provisional contracts. Prerequisites: completion of the approved teacher education program in the major area, departmental approval, and permission of the director of teacher education services; passing scores on PRAXIS I or State Board of Education-approved SAT or ACT scores and passing scores on the appropriate PRAXIS II content examination required.

SEPS 586. Middle School Student Teaching for Technical Education. 6 Credits.
Classroom placement for student teaching in a middle school technology laboratory. Students apply content and methodology under the supervision of a cooperating teacher and university faculty member. Available for pass/fail grading only. (qualifies as a CAP experience) Prerequisites: STEM 305, 306, SEPS 408, SPED 313; TLED 408 and SEPS 450; or SEPS 508, 596, STEM 730, SEPS 788, TLED 608, 616, READ 680 for graduate students; passing scores on PRAXIS I or State Board of Education-approved SAT or ACT scores and passing scores on the appropriate PRAXIS II content examination are required.

SEPS 595. Topics in Occupational Education. 1-3 Credits.
The department offers selected topics designed to permit small groups of qualified students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly. Prerequisite: permission of the instructor.

SEPS 596. Topics in Career and Technical Education. 1-3 Credits.
The department offers selected topics designed to permit small groups of qualified students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly. Prerequisite: permission of the instructor.

SEPS 597. Independent Study in Occupational Education. 1-6 Credits.
Independent study. Prerequisite: permission of the instructor.

SEPS 603. Planning Issues for Vocational Special Needs Programs. 3 Credits.
Overview of vocational special needs programs and services including their purposes and practices; characteristics of special populations, including the medical and educational aspects of disability.

SEPS 604. Implementation and Administration of Vocational Special Needs Programs. 3 Credits.
This course includes career/life planning, transitioning, occupational information, and delivery of cooperative education programs, instructional methods, and curriculum modification and resources available to support vocational special needs programs.

SEPS 606. Vocational Evaluation Processes. 3 Credits.
Lecture 3 hours; 3 credits. This course includes the basic concepts and skills of planning for and delivering vocational evaluation and career assessment services, the use of vocational interview, individualized service planning, report development and communication, and use of modifications and accommodations. Students practice specific assessment techniques and skills on the processes used in vocational evaluation and career assessment, including job and training analysis, work samples and systems, situational and community-based assessment, behavioral observation, and learning and functional skills assessment.

SEPS 635. Research Methods in Occupational and Technical Studies. 3 Credits.
Types of research, selection of problems, location of educational information, collection and classification of data, organization, presentation, and interpretation of findings. The focus is on conducting research in the student's content specialty area.

SEPS 636. Problems in Occupational and Technical Studies. 3 Credits.
Taken the last semester of graduate work. Practice in the use of statistical and analytical techniques in solving problems in occupational and technical studies related to secondary, community college, and training environments. Prerequisites: FOUN 612.

SEPS 695. Topics in Occupational Education. 1-3 Credits.
The department offers selected topics designed to permit small groups of qualified students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly.

SEPS 696. Topics in Occupational Education. 1-3 Credits.
The department offers selected topics designed to permit small groups of qualified students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly.

SEPS 697. Independent Study in Occupational Education. 1-3 Credits.
Individual study under the supervision of a graduate faculty member. Prerequisites: permission of the instructor.

SEPS 698. Thesis in Occupational Education. 3-6 Credits.
Research and writing of the master's thesis and scheduled conferences with the candidate's advisor. Prerequisite: permission of the advisor.

SEPS 740. Readings in Occupational and Technical Studies. 3 Credits.
A guided review of the literature to determine the history, development, and issues of occupational and technical education, including specialization in technology education, career and technical education specialties, and human resources training.

SEPS 750. Trends and Issues in Training: Modeling and Simulation. 3 Credits.
This course is designed to explore the issues and trends in developing and implementing technology-based training with emphasis on modeling and simulation.

SEPS 760. Trends and Issues in Occupational Education. 3 Credits.
This course prepares training and educational professionals to plan for and conduct assessments to use in planning research findings and issues related to tech prep and other articulated programs being established in secondary schools, community colleges, and four-year institutions. Prerequisites: junior standing.

SEPS 761. Foundations of Adult Education and Training. 3 Credits.
This course is a study of adult education and training in many settings including the community college, business, industry, labor, government, the military, and social service agencies of many types. An attempt will be made to assess the important trends or directions such activities are taking, including the needs of non-traditional learners and education and labor.

SEPS 762. Administration and Management of Education and Training Programs. 3 Credits.
This course deals with organizational policy, human and financial resources, facilities, and the planning process as applied to occupational education and adult training programs.
SEPS 765. Trends and Issues of Economic and Workforce Development. 3 Credits.
An analysis of economic trends and issues that lead to workforce development decisions. Focus is on planning for educational and training programs to meet workforce needs dictated by local and regional economic issues. This course is designed for community college and school system personnel. Prerequisite: student must be accepted into doctoral program or have permission of the instructor.

SEPS 780. Administration and Supervision of Occupational Education. 3 Credits.
Study of the principles and practices of administering and supervising occupational education programs.

SEPS 785. Curriculum Development in Occupational Education and Training. 3 Credits.
A course designed to prepare students to design and develop curriculum for occupational education and training courses and programs. Included is a focus on articulation between secondary and post-secondary curriculum.

SEPS 787. Career and Technical Education Curriculum. 3 Credits.
Learn the various curriculum options taught in secondary schools under the auspices of career and technical education. Work from an administrative standpoint to learn the mission and goals of the various subject areas and plan to direct such efforts.

SEPS 788. Instructional Strategies for Innovation in Training and Occupational Education. 3 Credits.
Learning and teaching styles are considered as a basis for developing instructional strategies to maximize occupational and technical education at all levels, including secondary, the community college, and senior institutions. Relevant learning theories and knowledge of self, learner, and the environment are blended to enhance the participants' instructional strategies.

SEPS 789. Instructional Technology in Education and Training. 3 Credits.
A course that provides insights about trends, issues, and the applications of instructional technologies as they may be applied to education and training environments. Topics include selected technical processes and electronic media to solve practical problems in educations and training.

SEPS 790. Practicum in Occupational Education. 3 Credits.
Individually prescribed instruction under the supervision of a graduate faculty member. Study intended to professionally fulfill development of graduate candidates. Prerequisite: permission of the graduate program director.

SEPS 795. Topics in Occupational Education. 1-3 Credits.
The department offers selected topics designed to permit groups of qualified students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly.

SEPS 797. Independent Study in Occupational Education. 1-6 Credits.
Individual study under the supervision of a graduate faculty member. Prerequisite: Permission of the instructor.

SEPS 835. Research Design for Occupational and Technical Studies. 3 Credits.
Analyses of current research and needs in occupational and technical studies. Students analyze the literature and develop a research focus for future graduate studies.

SEPS 840. Readings in Occupational and Technical Studies. 3 Credits.
A guided review of the literature to determine the history, development, and issues of occupational and technical education, including specialization in technology education, career and technical education specialties, and human resources training.

SEPS 850. Trends and Issues in Training: Modeling and Simulation. 3 Credits.
This course is designed to explore the issues and trends in developing and implementing technology-based training with emphasis on modeling and simulation.

SEPS 860. Trends and Issues in Occupational Education. 3 Credits.
Trends in philosophy, workforce needs, curriculum and teaching procedures in occupational and technical education. Analysis of research findings and issues related to tech prep and other articulated programs being established in secondary schools, community colleges, and four-year institutions.

SEPS 861. Foundations of Adult Education and Training. 3 Credits.
This course is a study of adult education and training in many settings including the community college, business, industry, labor, government, the military, and social service agencies of many types. An attempt will be made to assess the important trends or directions such activities are taking, including the needs of non-traditional learners and education and labor.

SEPS 862. Administration and Management of Education and Training Programs. 3 Credits.
This course deals with organizational policy, human and financial resources, facilities, and the planning process as applied to occupational education and adult training programs.

SEPS 865. Trends and Issues of Economic and Workforce Development. 3 Credits.
An analysis of economic trends and issues that lead to workforce development decisions. Focus is on planning for educational and training programs to meet workforce needs dictated by local and regional economic issues. This course is designed for community college and school system personnel. Prerequisite: student must be accepted into doctoral program or have permission of the instructor.

SEPS 868. Internship. 3 Credits.
Supervised assignment to an agency operating an occupational education or training program. Prerequisite: permission of the instructor.

SEPS 880. Administration and Supervision of Occupational Education. 3 Credits.
Study of the principles and practices of administering and supervising occupational education programs.

SEPS 885. Curriculum Development in Occupational Education and Training. 3 Credits.
A course designed to prepare students to design and develop curriculum for occupational education and training courses and programs. Includes a focus on articulation between secondary and post-secondary curriculum.

SEPS 887. Career and Technical Education Curriculum. 3 Credits.
Learn the various curriculum options taught in secondary schools under the auspices of career and technical education. Work from an administrative standpoint to learn the mission and goals of the various subject areas and plan to direct such efforts.

SEPS 888. Instructional Strategies for Innovation in Training and Occupational Education. 3 Credits.
Learning and teaching styles are considered as a basis for developing instructional strategies to maximize occupational and technical education at all levels, including secondary, the community college, and senior institutions. Relevant learning theories and knowledge of self, learner, and the environment are blended to enhance the participants' instructional strategies.

SEPS 889. Instructional Technology in Education and Training. 3 Credits.
A course that provides insights about trends, issues, and the applications of instructional technologies as they may be applied to education and training environments. Topics include selected technical processes and electronic media to solve practical problems in educations and training.

SEPS 890. Practicum in Occupational Education. 3 Credits.
Individually prescribed instruction under the supervision of a graduate faculty member. Study intended to professionally fulfill development of graduate candidates. Prerequisites: permission of the graduate program director.

SEPS 895. Topics in Occupational Education. 1-3 Credits.
The department offers selected topics designed to permit groups of qualified students to work on subjects of mutual interest which, due to their specialized nature, may not be offered regularly.
SEPS 897. Independent Study in Occupational Education. 1-6 Credits.
Individual study under the supervision of a graduate faculty member.
Prerequisite: Permission of the instructor.

SEPS 899. Dissertation in Occupational Education. 1-12 Credits.
Work on pre-selected dissertation topics under the direction of dissertation committee chair. Prerequisite: permission of dissertation committee chair.

SEPS 998. Master’s Graduate Credit. 1 Credit.
This course is a pass/fail course for master’s students in their final semester. It may be taken to fulfill the registration requirement necessary for graduation. All master’s students are required to be registered for at least one graduate credit hour in the semester of their graduation.

SEPS 999. Doctoral Graduate Credit. 1 Credit.
This course is a pass/fail course doctoral students may take to maintain active status after successfully passing the candidacy examination. All doctoral students are required to be registered for at least one graduate credit hour every semester until their graduation.