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

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

Petros Katsioulidis, Chair

The Department of STEM Education and Professional Studies offers three concentrations under the Bachelor of Science degree in occupational and technical studies: training specialist, fashion merchandising, and industrial technology. The department also offers a Bachelor of Science degree in career and technical education (http://catalog.odu.edu/undergraduate/dardencollegeofeducation/stemeducationprofessionalstudies/bs-careerandtechnicaleducation/) with concentrations in marketing education and technology education. At the graduate level, the department offers the Master of Science degree with concentrations in business and industry training and library and information studies; the Master of Science in Education degree with a major in instructional design and technology; a concentration within the Education Specialist in educational leadership; and the Ph.D. in Education with concentrations in instructional design and technology and occupational and technical studies. The department also offers minors in fashion merchandising, training and development, and marketing education, a certificate in industrial training, and licensure/endorsement programs in marketing teacher education, technology education, and industrial cooperative training. Several licensure/endorsement areas are available for graduate students. The department provides a simulation-based instruction concentration in the Master of Science in Engineering modeling and simulation degree program.

Bachelor of Science - Occupational and Technical Studies
Fashion Merchandising Concentration

This program is designed to prepare students to enter the fashion industry to become buyers, fashion coordinators, and merchandise managers. Requirements are as follows:

Lower-Division General Education

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written Communication</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Oral Communication</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Mathematical Skills</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MATH 102M College Algebra</td>
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<tr>
<td>or MATH 103M College Algebra with Supplemental Instruction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Language and Culture</td>
<td>0-6</td>
<td></td>
</tr>
<tr>
<td>Information Literacy and Research</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>STEM 251G Computer Literacy: Communication and Information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human Creativity (cannot be met by SEPS 223A)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Interpreting the Past</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Literature</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Philosophy and Ethics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>The Nature of Science</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Human Behavior (ECON 200S required)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Impact of Technology (satisfied by STEM 370T in the major)</td>
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</table>

Technical Content Courses 55

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT 201</td>
<td>Principles of Financial Accounting</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGMT 325</td>
<td>Contemporary Organizations and Management</td>
<td></td>
</tr>
<tr>
<td>SEPS 100</td>
<td>Sales Techniques</td>
<td></td>
</tr>
<tr>
<td>SEPS 102</td>
<td>Advertising and Promotion</td>
<td></td>
</tr>
<tr>
<td>SEPS 203S</td>
<td>Dress, Culture and Society</td>
<td></td>
</tr>
<tr>
<td>SEPS 208</td>
<td>Retail Merchandising and Buying</td>
<td></td>
</tr>
<tr>
<td>SEPS 220</td>
<td>The Fashion Industry</td>
<td></td>
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<tr>
<td>SEPS 234</td>
<td>Survey of Dress and Costume</td>
<td></td>
</tr>
<tr>
<td>SEPS 355</td>
<td>Fashion Consumer Behavior</td>
<td></td>
</tr>
<tr>
<td>SEPS 405</td>
<td>Directed Work Experience</td>
<td></td>
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<tr>
<td>SEPS 415</td>
<td>Advanced Merchandising</td>
<td></td>
</tr>
<tr>
<td>SEPS 422</td>
<td>Fashion Product Development</td>
<td></td>
</tr>
<tr>
<td>SEPS 427</td>
<td>Fashion Marketing</td>
<td></td>
</tr>
<tr>
<td>SEPS 435</td>
<td>International Retailing</td>
<td></td>
</tr>
<tr>
<td>SEPS 456</td>
<td>E-Commerce and Social Media in Fashion</td>
<td></td>
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<tr>
<td>SEPS 480</td>
<td>Senior Project: Merchandise Retailing</td>
<td></td>
</tr>
<tr>
<td>SEPS 481</td>
<td>Occupational Career Transition</td>
<td></td>
</tr>
<tr>
<td>STEM 370T</td>
<td>Technology and Society (Writing Intensive)</td>
<td></td>
</tr>
</tbody>
</table>

Select four of the following or other advisor approved electives: 12

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEPS 223A</td>
<td>Visual Merchandising and Display</td>
<td></td>
</tr>
<tr>
<td>SEPS 409</td>
<td>Fashion Forecasting Market Trip</td>
<td></td>
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<tr>
<td>SEPS 410</td>
<td>The Foreign Fashion Market Trip</td>
<td></td>
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<tr>
<td>SEPS 424</td>
<td>Fashion, Textiles, and Construction Analysis</td>
<td></td>
</tr>
<tr>
<td>SEPS 431</td>
<td>Web-Based Organization for Fashion</td>
<td></td>
</tr>
</tbody>
</table>

Elective Credit (consult the department advisor) 9

Upper-Division General Education

Total Hours 120-126

Elective credit may be needed to meet the minimum of 120 credits required for the degree.

* Grade of C or better required in both courses

** Grade of C or better required

Upper-Division General Education

- Option A. Approved Disciplinary Minor (a minimum of 12 hours determined by the department) or second degree or second major
- Option B. Interdisciplinary Minor (specifically 12 hours, 3 of which may be in the major)
- Option C. International Business and Regional Courses or an approved Certification Program such as teaching licensure
- Option D. Two Upper-Division Courses from outside the College of Education and not required by the major (6 hours)

Requirements for Graduation

Requirements for graduation include a minimum cumulative grade point average of 2.00 overall and in the major, 120 credit hours, which must include both a minimum of 30 credit hours overall and 12 credit hours in upper-level courses in the major program from Old Dominion University, completion of ENGL 110C, ENGL 211C or ENGL 221C or ENGL 231C, and the writing intensive (W) course in the major with a grade of C or better, and completion of Senior Assessment.

Four-Year Plan - OTS - Fashion Merchandising - BS (http://catalog.odu.edu/undergraduate/dardencollegeofeducation/stemeducationprofessionalstudies/ots-fashionmerch-bs-fouryearplan/)

This is a suggested curriculum plan to complete this degree program in four years. Please consult information in this Catalog, Degree Works, and your
academic advisor for more specific information on course requirements for this degree.

**Industrial Technology Concentration**

This program is designed to prepare students to enter industry as supervisors, technical managers, or trainers. This concentration is also available through the University’s distance learning system. Additional industrial technology technical concentration tracks are available for transfer students. On approval of the program leader, select technical content areas from the community college can satisfy the 30 hours of technical content for this emphasis. Requirements are as follows:

**Lower-Division General Education**

- Written Communication **6**
- Oral Communication (met in the major by HMSV 339) **6**
- Mathematical Skills
  - MATH 102M College Algebra
  - or MATH 103M College Algebra with Supplemental Instruction
  - STAT 130M Elementary Statistics
- Language and Culture **0-6**
- Information Literacy and Research **3**
- **STEM 251G Computer Literacy: Communication and Information**
- **Human Creativity (cannot be met by SEPS 223A)** **3**
- **Interpreting the Past** **3**
- **Literature** **3**
- **Philosophy and Ethics** **3**
- **The Nature of Science** **8**
- **Human Behavior (cannot be met by SEPS 203S)** **3**
- **PSYC 201S Introduction to Psychology** **3**

**Impact of Technology (satisfied by STEM 370T in the major)**

**Technical Content-General Emphasis** **24**

- MET 120 Computer Aided Drafting
- STEM 221 Industrial Materials
-STEM 231 Materials and Processes Technology
-STEM 241 Energy Systems: Basic Electricity
-STEM 242 Technological Systems Control
-STEM 321 Manufacturing Technology
-STEM 351 Communication Technology
-STEM 382 Industrial Design

**Supervision** **18**

- HMSV 339 Interpersonal Relations
- PSYC 303 Industrial/Organizational Psychology
- SEPS 302 Workforce Supervision
- SEPS 400 Instructional Systems Development
- SEPS 402 Instructional Methods in Occupational Studies
- STEM 370T Technology and Society (Writing Intensive)

**Business Cognate** **21**

- ACCT 201 Principles of Financial Accounting
- MGMT 325 Contemporary Organizations and Management
- MGMT 330 Organizational Behavior
  - or MGMT 340 Human Resources Management
- MKTG 311 Marketing Principles and Problems

**Approved Business Electives (Three Courses)**

**Elective credit** **13**

**Upper-Division General Education** **6**

**Total Hours** **120-126**

Elective credit may be needed to meet the minimum of 120 credits required for the degree.

- **Grade of C or better required in both courses**
- **Grade of C or better required**

**Upper-Division General Education**

- **Option A. Approved Disciplinary Minor (a minimum of 12 hours determined by the department) or second degree or second major**
- **Option B. Interdisciplinary Minor (specifically 12 hours, 3 of which may be in the major)**
- **Option C. International Business and Regional Courses or an approved Certification program such as teaching licensure**
- **Option D. Two Upper-Division Courses from outside the College of Education and not required by the major (6 hours)**

**Requirements for Graduation**

Requirements for graduation include a minimum cumulative grade point average of 2.00 overall and in the major, 120 credit hours, which must include both a minimum of 30 credit hours overall and 12 credit hours in upper-level courses in the major program from Old Dominion University, completion of ENGL 110C, ENGL 211C or ENGL 221C or ENGL 231C, and the writing intensive (W) course in the major with a grade of C or better, and completion of Senior Assessment.

**Four-Year Plan - OTS - Industrial Technology - BS (http://catalog.odu.edu/undergraduate/dardencollegeofeducation/stemeducationprofessionalstudies/ots-industrialtech-bs-fouryearplan/)**

This is a suggested curriculum plan to complete this degree program in four years. Please consult information in this Catalog, Degree Works, and your academic advisor for more specific information on course requirements for this degree.

**Training Specialist Concentration**

This program is designed to prepare students as training specialists who design, develop, and present training in business and industry. This concentration is also available through the University's distance learning system. On approval of the program leader, select business-related technical content areas from the community college can satisfy 30 hours of technical content for this emphasis. Requirements are as follows:

**Lower-Division General Education**

- Written Communication **6**
- Oral Communication (met in the major by HMSV 339) **6**

**Mathematical Skills**

- MATH 102M College Algebra
  - or MATH 103M College Algebra with Supplemental Instruction

**Language and Culture** **0-6**

**Information Literacy and Research** **3**

**Human Creativity (cannot be met by SEPS 223A)** **3**

**Interpreting the Past** **3**

**Literature** **3**

**Philosophy and Ethics** **3**

**The Nature of Science** **8**

**Human Behavior (cannot be met by SEPS 203S)** **3**

**PSYC 201S Introduction to Psychology** **3**

**Impact of Technology (satisfied by STEM 370T in the major)**

**Technical Content Courses** **46**

- ACCT 201 Principles of Financial Accounting
**Bachelor of Science in Career and Technical Education - Marketing Education and Technical Education Concentrations** [http://catalog.odu.edu/undergraduate/dardencollegeofeducation/stemeducationprofessionalstudies/bs-careerandtechnicaleducation/]

**Minor in Fashion Merchandising**

The department offers a minor in fashion merchandising for students majoring in disciplines other than occupational and technical studies concentration areas. Requirements for the minor are completion of 12 credit hours from among the following courses:

Select four of the following: 12

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEPS 302</td>
<td>Workforce Supervision</td>
</tr>
<tr>
<td>SEPS 367</td>
<td>Cooperative Education</td>
</tr>
<tr>
<td>SEPS 405</td>
<td>Directed Work Experience</td>
</tr>
<tr>
<td>SEPS 409</td>
<td>Fashion Forecasting Market Trip</td>
</tr>
<tr>
<td>SEPS 410</td>
<td>The Foreign Fashion Market Trip</td>
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<tr>
<td>SEPS 415</td>
<td>Advanced Merchandising</td>
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<td>Fashion Product Development</td>
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<td>SEPS 424</td>
<td>Fashion, Textiles, and Construction Analysis</td>
</tr>
<tr>
<td>SEPS 431</td>
<td>Web-Based Organization for Fashion</td>
</tr>
<tr>
<td>SEPS 435</td>
<td>International Retailing</td>
</tr>
<tr>
<td>or SEPS 440</td>
<td>Fashion Global Sourcing/Supply Chain Management</td>
</tr>
<tr>
<td>SEPS 495</td>
<td>Topics in Occupational Education</td>
</tr>
<tr>
<td>SEPS 496</td>
<td>Topics in Career and Technical Education</td>
</tr>
</tbody>
</table>

Total Hours 12

* Prior approval required

SEPS 208 or SEPS 220 are prerequisites for the minor and are not included in the calculation of the grade point average for the minor. Students must have a minimum overall cumulative grade point average of 2.00 in all courses specified as a requirement for the minor exclusive of 100- and 200-level courses and prerequisite courses and complete a minimum of six hours in upper-level courses in the minor through courses offered by Old Dominion University.

**Minor in Training and Development**

The minor in training and development is offered by the department for students majoring in disciplines other than occupational and technical studies concentration areas. The minor requires 15 hours of course work as follows:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEPS 389</td>
<td>Education and Training of Adults</td>
</tr>
<tr>
<td>SEPS 400</td>
<td>Instructional Systems Development</td>
</tr>
<tr>
<td>SEPS 402</td>
<td>Instructional Methods in Occupational Studies</td>
</tr>
<tr>
<td>SEPS 450</td>
<td>Assessment, Evaluation and Improvement</td>
</tr>
<tr>
<td>STEM 351</td>
<td>Communication Technology</td>
</tr>
</tbody>
</table>

Total Hours 15

Students must have a minimum overall cumulative grade point average of 2.00 in all courses specified as a requirement for the minor exclusive of 100- and 200-level courses and prerequisite courses and six hours of the 300/400-level courses must be taken through courses offered by Old Dominion University.

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**Upper-Division General Education**

- Option A. Approved Disciplinary Minor (a minimum of 12 hours determined by the department) or second degree or second major
- Option B. Interdisciplinary Minor (specifically 12 hours, 3 of which may be in the major)
- Option C. International Business and Regional Courses or an approved Certification Program such as teaching licensure
- Option D. Two Upper-Division Courses from outside the College of Education and not required by the major (6 hours)

**Requirements for Graduation**

Requirements for graduation include a minimum cumulative grade point average of 2.00 overall and in the major, 120 credit hours, which must include both a minimum of 30 credit hours overall and 12 credit hours in upper-level courses in the major program from Old Dominion University, completion of ENGL 110C, ENGL 211C or ENGL 221C or ENGL 231C, and the writing intensive (W) course in the major with a grade of C or better, and completion of Senior Assessment.

**Four-Year Plan - OTS - Training Specialist - BS** [http://catalog.odu.edu/undergraduate/dardencollegeofeducation/stemeducationprofessionalstudies/ots-trainingspecialist-bs-fouryearplan/]

This is a suggested curriculum plan to complete this degree program in four years. Please consult information in this Catalog, Degree Works, and your academic advisor for more specific information on course requirements for this degree.

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<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEM 339</td>
<td>Interpersonal Relations</td>
</tr>
<tr>
<td>MGMT 325</td>
<td>Contemporary Organizations and Management</td>
</tr>
<tr>
<td>MGMT 330</td>
<td>Organizational Behavior</td>
</tr>
<tr>
<td>or MGMT 340</td>
<td>Human Resources Management</td>
</tr>
<tr>
<td>MKTG 311</td>
<td>Marketing Principles and Problems</td>
</tr>
<tr>
<td>PSYC 201S</td>
<td>Introduction to Psychology</td>
</tr>
<tr>
<td>PSYC 303</td>
<td>Industrial/Organizational Psychology</td>
</tr>
<tr>
<td>SEPS 302</td>
<td>Workforce Supervision</td>
</tr>
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<td>SEPS 389</td>
<td>Education and Training of Adults</td>
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</tr>
<tr>
<td>SEPS 405</td>
<td>Directed Work Experience</td>
</tr>
<tr>
<td>STEM 370T</td>
<td>Technology and Society (Writing Intensive)</td>
</tr>
<tr>
<td>STEM 350</td>
<td>Communication Technology Processes</td>
</tr>
<tr>
<td>or STEM 351</td>
<td>Communication Technology</td>
</tr>
<tr>
<td>SEPS 450</td>
<td>Assessment, Evaluation and Improvement</td>
</tr>
</tbody>
</table>

Training Electives *** 27

Elective Credit 6

Upper-Division General Education 6

Total Hours 120-126

Elective credit may be needed to meet the minimum of 120 credits required for the degree.

* Grade of C or better required in both courses
** Grade of C or better required
*** Consult the departmental advisor for a list of approved courses used to meet this requirement.
The Impact of Technology Interdisciplinary Minor

Philip A. Reed, Department of STEM Education and Professional Studies, Coordinator

This interdisciplinary minor develops a broader understanding of technology and its impact on individuals, societies, and the environment. It provides the social context and the historical and philosophical backgrounds needed by informed students to evaluate technology and its impacts. The minor equips students with skills to make better personal decisions about technology and more appropriate choices for their futures.

Course options are as follows:

- CHP 360 Introduction to Global Health 3
- COMM 340 Media and Popular Culture 3
- COMM 372T Introduction to New Media Technologies 3
- COMM 400W Intercultural Communication 3
- COMM 401 Communication Theory 3
- COMM 448 Transnational Media Systems 3
- CS 300T Computers in Society 3
- CS 312 Internet Concepts 3
- ECON 402 Transportation Economics 3
- ECON 454W Economic Development 3
- ENGL 380 Reporting and News Writing I 3
- ENGL 382 Reporting News for Television and Digital Media 3
- ENVH 301 Principles of Environmental Health Science 3
- ENVH 402W Environmental and Occupational Health Administration and Law 3
- GEOG 305 World Resources 3
- GEOG 306T Hazards: Natural and Technological 3
- HIST 304T History of Medicine, Disease, and Health Technology 3
- HIST 389T Technology and Civilization 3
- HIST 389T/SCI 302T The Evolution of Modern Science 3
- IT 360T Principles of Information Technology 3
- MUSC 335T Music Technology Survey 3
- OPMT 303 Operations Management 3
- PHIL 355E Cybersecurity Ethics 3
- PHIL 383T Philosophy of Technology & Innovation 3
- POLS 350T Technology and War 3
- SOC 352 War and Peace 3
- STEM 370T Technology and Society 3
- STEM 382 Industrial Design 3
- WMST 390T Women and Technology Worldwide 3

The interdisciplinary minor in the Impact of Technology requires 12 credit hours of 300/400-level courses selected from at least two different disciplines with a maximum of six credits from any one discipline. For completion of the interdisciplinary minor, students must have a minimum overall cumulative grade point average of 2.00 in all courses specified as a requirement for the minor exclusive of lower-level courses and prerequisite courses. At least six hours of upper-level courses must be taken through courses offered by Old Dominion University. Three credit hours may be in the major, if a major course is listed as an option for the interdisciplinary minor. As such, it will be credited toward both the major and the interdisciplinary minor.

Certificate Program in Industrial Training

This program is designed especially for military and civilian instructors and trainers. It is directed to those individuals who possess technical skills in the military, industry, career and technical centers, or community colleges. An overall grade point average of 2.0 or above in all courses specified as a requirement for the certificate is required for the award of the certificate. Students must complete a minimum of six hours in upper-level courses required for the certificate through courses offered by Old Dominion University.

This certificate requires successful completion of the following 21 credit hours (seven courses).

- SEPS 302 Workforce Supervision 3
- SEPS 400 Instructional Systems Development 3
- SEPS 402 Instructional Methods in Occupational Studies 3
- STEM 351 Communication Technology 3
- STEM 370T Technology and Society 3
- PSYC 303 Industrial/Organizational Psychology 3
- HMSV 339 Interpersonal Relations 3

Total Hours 21

SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS EDUCATION Courses

STEM 101. Step 1 – Inquiry Approaches to Teaching STEM. 1 Credit.
Step 1 provides mathematics and science students with the opportunity to explore teaching in a real classroom setting. Master teachers introduce students to examples of high-quality inquiry-based lessons and model the pedagogical concepts to which they are being introduced. In Step 1, with the guidance of the master teacher, students engage in two classroom observations and prepare and teach three inquiry-based lessons in an upper elementary school classroom. A criminal background check will be required as part of this course.

STEM 102. Step 2 - Inquiry Based STEM Lesson Design. 1 Credit.
This course continues the exploration of inquiry-based lesson design in STEM education. In this course, students build upon and practice lesson design skills developed in Step 1 while also becoming familiar with exemplary mathematics or science curricula at the middle school level. With the guidance of the master teacher, students engage in one observation and prepare and teach three inquiry-based lessons in a middle school classroom. Students incorporate and demonstrate their content knowledge in developing the inquiry-based lessons. At the end of Step 2, students are generally ready to make a decision about whether they want to pursue a pathway to teacher licensure through the MonarchTeach program. Prerequisites: a grade of C or higher in STEM 101.

STEM 110T. Technology and Your World. 3 Credits.
An overview of the resources and systems of technology. Emphasis is on impacts that technology has on individuals and their careers. Activities explore the evolution of technology, its major systems and their impact on individuals and their careers.

STEM 201. Knowing and Learning in STEM Education. 3 Credits.
This course is designed to expand the students' understanding of current theories of learning and conceptual development in STEM. Students will investigate theories of knowing and learning in STEM and implications for teaching secondary mathematics and science. Students will examine their own assumptions about learning as well as critically examine the needs of a diverse student population in the classroom. Students are expected to independently register for and take the Praxis I examination while enrolled in this course. Pre- or corequisite: STEM 102.

STEM 202. Classroom Interactions in STEM Education. 3 Credits.
This course provides students with an overview of principles for teaching middle and secondary school mathematics or science through an exploration of the role of content, pedagogy, curriculum and technology as they promote learning and impact equity. Students are introduced to ways in which curriculum and technology are used in the classroom to build interrelationships among teachers and students. Frameworks for teaching students of diverse backgrounds equitably are emphasized in the course. A field component that consists of observations and teaching in the high school classroom is included. Prerequisites: grade of C or better in STEM 102. Pre- or corequisite: STEM 201.
STEM 221. Industrial Materials. 3 Credits.
A study of materials used by industry to produce products. Emphasis is on the study of ceramics, plastics, composites, and biotechnological materials. Students learn materials identification, use and processing.

STEM 231. Materials and Processes Technology. 3 Credits.
A study of the production processes used with metallic and forest product materials. Industrial resources, their location, extraction, and processing into standard stocks are also covered. Students learn properties, uses and processing of metal and wood materials.

STEM 241. Energy Systems: Basic Electricity. 3 Credits.
A study of direct and alternating current and its use in contemporary technology. Activities include experiments and projects to supplement the theory of electricity.

STEM 242. Technological Systems Control. 3 Credits.
Students will develop an understanding of systems control technology for application to energy and power, manufacturing, processing and transportation systems. Emphasis will be placed on research and development, creativity and experimentation, and trouble shooting in designing control systems.

STEM 251G. Computer Literacy: Communication and Information. 3 Credits.
A guided review of communication technology and information sources to help students discern between reliable and unreliable sources and techniques. Students develop skills in computer applications, information retrieval, filtering and analyzing data, and formatting and presenting information.

STEM 320. Manufacturing and Construction Technology. 3 Credits.
A study of production processes used in manufacturing and construction systems. Students will research and design manufactured products for mass production and constructed products for building. The social, cultural, environmental and economic impacts of manufacturing and constructed products on society are discussed. Prerequisites: STEM 221, STEM 231 or permission of instructor.

STEM 321. Manufacturing Technology. 3 Credits.
A study of the production processes used in manufacturing systems. Emphasis is placed upon planning, organizing and principles of manufacturing. Students research and design enterprise systems for mass production. Emphasis is on manufacturing design requirements and the social, cultural, and economic impacts of manufactured products on society and the environment. Prerequisites: STEM 221, STEM 231 or permission of instructor.

STEM 330. Medical, Agricultural, and Biological Technologies. 3 Credits.
A course for technology education majors that studies technological systems related to medical and food processing technologies. Students learn the basis of these technologies and complete activities that integrate the content with processes and products found in our technological world. Prerequisite: junior standing or permission of department.

STEM 350. Communication Technology Processes. 3 Credits.
The study of communication design principles and techniques for technology education. Emphasis is placed on the skills and equipment used in design, production, and distribution of communications. Print and electronic media are explored through technical illustration, video, audio, and other specialty processes of communications. Prerequisite: STEM 251G.

STEM 351. Communication Technology. 3 Credits.
A study of the development and impact of communication technology. Emphasis is placed on the integration of technical skills to produce information-based products such as print and telecommunications media. Prerequisite: junior standing or permission of the instructor.

STEM 360. Energy, Power, and Transportation Technologies. 3 Credits.
Study of the development of energy, power, and transportation systems and the movement of energy, power, people, and cargo. Areas of concern include vehicle systems design and support systems. Prerequisite: junior standing or permission of the instructor.

STEM 367. Cooperative Education. 1-3 Credits.
Available for pass/fail grading only. Student participation for credit based on the academic relevance of the work experience, criteria, and evaluative procedures as formally determined by the department and the Cooperative Education program prior to the semester in which the work experience is to take place. Prerequisites: approval by the department and Career Development Services, in accordance with the policy for granting credit for Cooperative Education programs.

STEM 370T. Technology and Society. 3 Credits.
A multidisciplinary course designed to provide insight into the fundamental, historical, and contemporary nature of technology as an area of human knowledge. Attention is given to the positive and negative aspects of technology and how they affect society. (This is a writing intensive course.) Prerequisites: grade of C or better in ENGL 211C or ENGL 221C or ENGL 231C; junior standing or permission of the instructor.

STEM 382. Industrial Design. 3 Credits.
Students will analyze and design products representative of today's industrial technological society. Emphasis will be placed upon design methodology, aesthetic value, and design thinking. Prerequisites: junior standing.

STEM 401. Project Based Instruction in STEM Education. 3 Credits.
Through a dynamic process of investigation and collaboration, students aim to master techniques for project-based investigations in STEM classrooms, and teach project-based lessons in the secondary classroom. Students work in teams to formulate questions, make predictions, design investigations, collect and analyze data, make products and share ideas. The use of assessments to improve student learning is emphasized in the course. This course includes a field component that consists of two observation days and three teaching days in a secondary classroom. Prerequisites: STEM 201 and STEM 202.

STEM 402. Perspectives on STEM. 3 Credits.
This course explores the historical, social, and philosophical implications of mathematics and science through investigations of significant episodes in their history. Students are brought to understand that science and mathematics are not merely body of facts, theories, and techniques but involve diverse processes by which they are continually generated and reformulated. Prerequisites: Junior standing, admission to the MonarchTeach program plus 12 credit hours of science or math courses, and STEM 401. Pre- or corequisite: STEM 485.

STEM 433/533. 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: MATH 102M, MATH 302, TLED 326, and Junior standing.

STEM 434/534. 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. Prerequisites: TLED 326 and Junior standing.

STEM 453/553. Developing Instructional Strategies 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. Corequisite: TLED 483. Prerequisites: TLED 301, TLED 430W, SPED 313, passing scores on the Praxis Core examination 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.
STEM 454/554. 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. Corequisite: TLED 483. Prerequisites: TLED 301, TLED 430W, SPED 313, passing scores on the Praxis Core examination 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.

STEM 485. Apprentice Teaching, 9 Credits.
Internship in school. Available for pass/fail grading only. Offers prospective teacher candidates a culminating experience that provides them with the tools needed for their first teaching jobs. Students are immersed in a local secondary school for 10 consecutive weeks and experience the expectations, processes, and rewards of teaching. As part of their Apprentice Teaching experience, candidates will be required to attend a one hour weekly seminar that will bring them together with master teachers to share experiences and to explore issues, problems, concerns, and processes related to their teaching experiences and to entering the profession of teaching. Corequisite: STEM 402. Prerequisites: Completion of all course work in the MonarchTeach professional development sequence program and BIOL 468W or CHEM 468 or OES 468W or PHYS 468W or SCI 468, passing scores on PRAXIS I or equivalent SAT or ACT scores as established by VA Board of Education, passing scores on the appropriate PRAXIS II content examination and the Virginia Communication and Literacy Assessment, departmental approval, minimum major and overall GPA of at least 2.75 and a criminal background check.

STEM 495/595. 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. Prerequisite: permission of the instructor.

STEM EDUCATION AND PROFESSIONAL STUDIES Courses

SEPS 100. Sales Techniques. 3 Credits.
This is an introductory course that emphasizes the concept of determining customer needs, wants, and desires and matching them to products and services for a long-term sales relationship.

SEPS 102. Advertising and Promotion. 3 Credits.
This is an introductory course designed to teach the fundamental product and service promotion processes of planning and producing advertising and promotion campaigns.

SEPS 195. Topics. 1 Credit.
Topics of current interest in the area of STEM Education and Professional Studies.

SEPS 203S. Dress, Culture and Society. 3 Credits.
This course is an analysis of dress in cultures around the world while developing an understanding of its relationship to human beings as biological, aesthetic, and social animals. Human beings dress their bodies to communicate identity and to receive personal satisfaction. Students will discover how global fashion, age, gender, ethnicity, and income influence the fashion industry and our lives.

SEPS 208. Retail Merchandising and Buying. 3 Credits.
This course introduces students to the fundamentals of retail merchandising and explores retail buyers' skills and responsibilities including identifying customers and vendors, retail mathematics, buying plans, and merchandise control.

SEPS 220. The Fashion Industry. 3 Credits.
Course is designed for marketing education and fashion students. It covers fashion as a force which alters patterns of change and growth in the fashion industry to include designers, manufacturers, buyers, retailers, and customers. Students explore the latest trends in style and materials.

SEPS 223A. 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.

SEPS 234. Survey of Dress and Costume. 3 Credits.
Whether high fashion or low, glitz or grunge, from revolutionary politics to the new machine age, war and depression to growth and prosperity, fashion dress and costume goes hand-in-hand with history. This course examines the evolution of dress and costume and finds innovation at every turn.

SEPS 295. Topics. 1 Credit.
Topics of current interest in the area of STEM Education and Professional Studies.

SEPS 297. Observation and Participation. 1 Credit.
Students observe middle and/or high school classes for 30 clock hours. Assist teachers and students in practical settings. Relate principles and theories of education and specialty content to actual practice in the classrooms and schools. Attend seminars related to contemporary school practices. Prerequisites: sophomore standing.

SEPS 302. Workforce Supervision. 3 Credits.
Explores the skills and knowledge required of successful supervisors: leading, motivating, setting goals, delegating, budgeting, interviewing, negotiating, counseling, coaching, conducting meetings, and handling grievances. Prerequisite: junior standing or permission of the instructor.

SEPS 355. Fashion Consumer Behavior. 3 Credits.
This course is designed to enhance a student's understanding of what drives customers' wants and needs for fashion merchandise. Students examine the forces that affect consumer buying behavior and how they relate to the marketing of fashion. Prerequisites: SEPS 208 and SEPS 220.

SEPS 367. Cooperative Education. 1-3 Credits.
Student participation for credit based on the academic relevance of the work experience, criteria, and evaluative procedures as formally determined by the department and the Cooperative Education program prior to the semester in which the work experience is to take place. Prerequisite: approval by the department in accordance with the policy for granting credit for Cooperative Education programs.

SEPS 389. Education and Training of Adults. 3 Credits.
An in-depth overview of education and training of adults. Attention is given to adult learning theory and strategies for facilitating the learning process. Aspects of the course will focus on helping students understand and visualize jobs and careers in adult education and training. Prerequisite: junior standing or permission of the instructor.

SEPS 395. 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. Prerequisite: permission of the instructor.

SEPS 400/500. 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. Prerequisite: junior standing.

SEPS 401/501. 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. Prerequisite: junior standing.
SEPS 402/502. 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 and presentations. Prerequisite: SEPS 400.

SEPS 405. Directed Work Experience. 4 Credits.
Student must be employed the summer prior to his/her senior year in an emphasis-related job approved by the instructor. The student work is supervised by a job supervisor and the course instructor in a cooperative effort. Must complete a job package that describes all aspects of the organization. Prerequisites: junior standing.

SEPS 408/508. 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 and VCLA are course completion requirements. Prerequisite: admission to an approved teacher education program.

SEPS 409/509. 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. Prerequisite: SEPS 208.

SEPS 410/510. 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 415. Advanced Merchandising. 3 Credits.
This course is designed for marketing education and fashion students. It includes advanced merchandising math concepts used in the merchandising industry. Topics include pricing and re-pricing merchandise, creating and analyzing six-month plans, maintaining inventory control, and solving problems that are typically experienced in the merchandising field. Prerequisite: SEPS 208.

SEPS 420. Fashion Research. 3 Credits.
This course is designed to apply diverse research methods to explore the complex dynamics in fashion. Utilizing an interdisciplinary approach, students will engage in diverse topics in fashion bridging the gap between theory and practice. Prerequisites: SEPS 208 and SEPS 220.

SEPS 422. Fashion Product Development. 3 Credits.
Students work step-by-step through the preproduction processes of apparel product development: planning, forecasting, fabricating, developing silhouettes and specifications, pricing, and sourcing. The course demonstrates how these processes must be coordinated to get the right product to retail when consumers want it and at a price they are willing to pay. Prerequisites: SEPS 208 and SEPS 220.

SEPS 424/524. 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: junior standing or permission of the instructor.

SEPS 427. Fashion Marketing. 3 Credits.
This course explains key concepts of fashion marketing and illustrates how they are applied within the fashion industry. Using examples and case studies, students will examine how marketers develop and apply strategies that meet consumer needs for fashion products. Prerequisites: SEPS 208 and SEPS 220.

SEPS 431/531. 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. Prerequisite: STEM 251G.

SEPS 435/535. 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. Prerequisites: SEPS 220 or SEPS 208.

SEPS 440/540. 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. Prerequisite: SEPS 220 or SEPS 208.

SEPS 450/550. 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. Prerequisite: junior standing.

SEPS 456. E-Commerce and Social Media in Fashion. 3 Credits.
This course is designed to understand the expanding fields of e-commerce and social media. It will focus on examining features available in social media and the web/mobile technologies and their ability to improve fashion marketing strategies. Prerequisites: SEPS 208 and SEPS 220.

SEPS 480. Senior Project: Merchandise Retailing. 3 Credits.
A senior capstone course in which fashion and business knowledge and skills are applied to plan and implement a merchandise retailing business. Students must submit a professional quality written report and present results to a panel of consultants. Course to be taken in the final semester before graduation.

SEPS 481. Occupational Career Transition. 3 Credits.
To provide the senior-level student majoring in occupational and technical studies with the skills and techniques necessary to bridge the gap from college to career. Focus is on the generation of a professional portfolio and experiential learning that will transfer into today's job market. This course should be taken in the final semester before graduation. Prerequisites: Senior standing.

SEPS 484/584. 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; passing scores on the appropriate PRAXIS II content examination required.

SEPS 485. Student Teaching. 12 Credits.
Five days per week, full semester. Available for pass/fail grading only. Prerequisites: completion of the approved teacher education program in the major area, departmental approval, 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 permission of the director of teacher education services.
SEPS 486/586. 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. Prerequisites: SEPS 408, SPED 313, TLED 408 and SEPS 450; or SEPS 508, SEPS 596, STEM 730, SEPS 788, TLED 608, 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 495/595. Topics in Occupational Education. 1-3 Credits.
The department offers selected topics designed to permit small groups of qualified students to work in subjects of mutual interest which, due to their specialized nature, may not be offered regularly. Prerequisite: permission of the instructor.

SEPS 496/596. Topics in Career and Technical Education. 1-3 Credits.
The department offers selected topics designed to permit small groups of qualified students to work in subjects of mutual interest which, due to their specialized nature, may not be offered regularly. Prerequisites: permission of the instructor.

SEPS 497/597. Independent Study in Occupational Education. 1-6 Credits.
Independent study. Prerequisite: permission of the instructor.

SEPS 498. Independent Study in Occupational Education. 1-6 Credits.
Independent study. Prerequisite: permission of the instructor.