

ASSOCIATE OF SCIENCE DEGREE (831)

# Engineering

**Purpose:** Engineers are the planners and designers of the technological systems that are the backbone of our modern society. They apply principles of science and mathematics to meet the needs or solve the problems of humankind. These problems typically are multifaceted and involve the interplay of technological, economic, environmental, sociological, and political components. For this reason, the engineer requires a background in the humanities and Social Sciences as well as in mathematics and natural sciences.

**Occupational Objectives:** The Associate of Science degree program in Engineering is designed for persons who plan to transfer to a four-year college or university to complete a baccalaureate degree. The following engineering fields are supported by this program: aerospace and ocean, biological systems, chemical, civil and environmental, electrical and computer, engineering science and mechanics, industrial and systems engineering, material science, mechanical, mining and minerals.

In order to prepare for junior class standing at a four-year college or university, the student usually must complete a program at Virginia Western that is comparable in length and course content to the first two years of the program at the four-year institution. Students are urged to acquaint themselves with the requirements of the department in the college or university to which transfer is contemplated and also to consult with the Advising and Retention Services office of Virginia Western in planning their program and selecting electives.

**Admission Requirements:** Applicants must meet the general requirements for admission to the college. Developmental courses are required for students with deficiencies in English and mathematics.

Students who do not place into college-level English on the placement test will be required to take developmental courses (i.e., ENG 1, ENG 3, ENG 4, ENG 7).

Students who do not place above Algebra II (MTH 4) and into the pre-requisite course for calculus (MTH 166) on the placement test will be required to take developmental courses. Students who place into college-level classes who have completed Pre-calculus and Trigonometry in high school with a grade of "A" within the past three years have the option to complete a challenge exam to determine their

**CURRICULUM AND OTHER REQUIREMENTS**

<b>GENERAL EDUCATION CORE COURSES</b>	<b>CREDITS</b>
CHM 111 <sup>5,*</sup> ..... College Chemistry I .....	4
CST 100 ..... Principles of Public Speaking .....	3
ENG 111-112* ..... College Composition I-II .....	6
HLT/PED <sup>1</sup> ..... Health or Physical Education .....	1
MTH 175-176* ..... Calculus of One Variable I-II .....	6
MTH 177* ..... Introductory Linear Algebra .....	2
MTH 178* ..... Topics in Analytic Geometry .....	2
MTH 277* ..... Vector Calculus .....	4
MTH 291* ..... Differential Equations .....	3
PHY 241-242* . University Physics I-II .....	8
SDV 101 ..... Orientation to Engineering and Engineering Technology .....	1
E <sup>3</sup> ..... Humanities/Fine Arts Elective .....	3
E <sup>2</sup> ..... Social Science Elective .....	6

**ENGINEERING COURSES**

EGR 120* ..... Introduction to Engineering .....	2
EGR 124** ..... Introduction to Engineering and Engineering Methods .....	3
EGR 126** ..... Computer Programming for Engineers [C++] .....	3
EGR 140* ..... Engineering Mechanics–Statics .....	3
E <sup>4</sup> ..... Engineering/Science Elective .....	6
<b>Total Minimum Credits for Degree .....</b>	<b>66</b>

<sup>1</sup> Two credits of Health (HLT), Physical Education (PED) or Student Development (SDV) are required of all students. Consult approved Health courses in the Description of Courses for selection. Veterans with an honorable discharge will be awarded HLT/PED credit based on military service.

<sup>2</sup> Social Science electives must be selected from the "Approved List of Transfer courses." If the student is transferring to a four-year institution, the student should select the Social Science courses at VWCC that will satisfy the Social Science requirements at the four-year institution.

<sup>3</sup> Humanities/Fine Arts elective must be chosen from the "Approved List of Humanities Transfer Courses." A two-semester sequence of the same course is strongly recommended. If planning on transfer, contact four-year institution for requirements.

<sup>4</sup> The following are suggested Engineering/Science electives for Engineering majors: Mechanical Engineering: EGR 245-246, Civil Engineering: EGR 206/246, Electrical Engineering: EGR 206/251-255, MTH 285, or MTH 287; Computer Science: MTH 287.

<sup>5</sup> Chemical engineering majors should take CHM 112 as one of the Engineering/Science electives.

\* This course has a prerequisite. Prerequisites for all courses are listed in the course description section at the back of the catalog.

\*\*This course has a co-requisite. Co-requisites for all courses are listed in the course description section at the back of the catalog.

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**Engineering cont'd**

readiness for MTH 175. A passing score on the challenge exam or successful completion of MTH 166 is required before a student can enroll in MTH 175.

**Program Requirements:** Based on an articulation agreement with Virginia Tech, students who have completed the Engineering AS degree with a cumulative GPA of 3.0 or greater are guaranteed admission to the general engineering program at Virginia Tech. It is strongly recommended that students take ENG 111 in the first semester of coursework.

**SUGGESTED SCHEDULE****FIRST YEAR****FALL**

CHM 111

EGR 124

ENG 111

HLT/PED

MTH 175

MTH 177

SDV 101

**SPRING**

EGR 120

EGR 126

EGR 140

ENG 112

MTH 176

MTH 178

**SECOND YEAR****FALL**

MTH 277

PHY 241

Engin/Science Elective

Humanities/Fine Arts

Social Science Elective

**SPRING**

CST 100

MTH 291

PHY 242

Engin/Science Elective

Social Science Elective

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## Engineering cont'd

**Purpose:** The **Specialization in Computer Science** is the study of the theoretical foundations of information and computation, and of practical techniques for implementation and application in computer systems. It is often described as a systematic study of algorithmic processes that create, describe, and transform information. All types of information from business applications to data storage, gaming, web development, and programming are covered in the field. A very strong mathematical foundation is required.

**Occupational Objectives:** The Specialization in Computer Science is designed for students who plan to transfer to a four-year college and major in computer science or information technology. Requirements are not the same at every school. Students should speak with their advisor and the four-year college of interest in order to work out the specific requirements that need to be met. Students will need at least a 3.0 GPA and must complete all requirements in the specialization to be considered at most institutions.

**Admission Requirements:** Applicants must meet the general admission requirements for admission to the college. Developmental courses are required for students with deficiencies in English and mathematics.

Students who do not place into college-level English on the placement test will be required to take developmental courses (i.e., ENG 1, ENG 3, ENG 4, ENG 7).

Students who do not place above Algebra II (MTH 4) and into the pre-requisite course for calculus (MTH 163 or 166) on the placement test will be required to take developmental courses. Students who place into college-level classes and have not completed Pre-calculus or Trigonometry in high school with a grade of "A" within the past three years or who have not completed a college level Pre-calculus or Pre-calculus with Trigonometry (or equivalent) course will be required to take MTH 163 or MTH 166.

**Program Requirements:** It is strongly recommended that students take ENG 111 in the first semester of coursework.

### COMPUTER SCIENCE SPECIALIZATION (01)

#### CURRICULUM AND OTHER REQUIREMENTS

GENERAL EDUCATION CORE COURSES		CREDITS
CST 100	Principles of Public Speaking	3
ENG 111-112*	College Composition I-II	6
HLT/PED <sup>1</sup>	Health or Physical Education	1
MTH 175-176*	Calculus of One Variable I-II	6
MTH 177**	Introductory Linear Algebra	2
MTH 178**	Topics in Analytic Geometry	2
MTH 277*	Vector Calculus	4
MTH 287*	Mathematical Structures	3
MTH 291*	Differential Equations	3
PHY 241-242*	University Physics I-II (or CHM 111-112)	8
SDV 101	Orientation to Engineering	1
E <sup>3</sup>	Humanities/Fine Arts Elective	3
E <sup>2</sup>	Social Science Elective	6

#### ENGINEERING AND COMPUTER SCIENCE COURSES

CSC 201-202*	Computer Science I-II	8
CSC 205	Computer Organization	4
EGR 120*	Introduction to Engineering	2
EGR 124**	Introduction to Engineering and Engineering Methods	3
E <sup>4</sup>	Engineering/Science Elective	3
<b>Total Minimum Credits for Degree</b>		<b>68</b>

<sup>1</sup> Two credits of Health (HLT), Physical Education (PED) or Student Development (SDV) are required of all students. Consult approved Health courses in the Description of Courses for selection. Veterans with an honorable discharge will be awarded HLT/PED credit based on military service.

<sup>2</sup> Social Science electives must be selected from the "Approved List of Transfer courses." If the student is transferring to a four-year institution, the student should select the Social Science courses at VWCC that will satisfy the Social Science requirements at the four-year institution.

<sup>3</sup> Humanities/Fine Arts elective must be chosen from the "Approved List of Humanities Transfer Courses." A two-semester sequence of the same course is strongly recommended. If planning on transfer, contact four-year institution for requirements.

<sup>4</sup> Engineering/Science Elective - students transferring to Virginia Tech should take CHM 111 or PHY 241 (whichever they did not choose above). Those transferring to other four year institutions should take EGR 126 or contact their advisor for approval on choice for this elective.

\* This course has a prerequisite. Prerequisites for all courses are listed in the course description section at the back of the catalog.

\*\* This course has a co-requisite. Co-requisites for all courses are listed in the course description section at the back of the catalog.

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**Engineering cont'd****SUGGESTED SCHEDULE****FIRST YEAR/FALL**

CSC 201  
 EGR 124  
 ENG 111  
 MTH 175  
 MTH 177  
 SDV 101

**SPRING**

CSC 202  
 EGR 120  
 ENG 112  
 MTH 176  
 MTH 178  
 MTH 287

**SECOND YEAR/FALL**

CSC 205  
 MTH 277  
 PHY 241 or CHM 111  
 Humanities/Fine Arts  
 Social Science Elective

**SPRING**

CST 100  
 HLT/PED  
 PHY 242 or CHM 112  
 Engineering Elective  
 Social Science Elective