Virginia CTE

Engineering Studies (8491) 36 weeks

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A Demonstrating Personal Qualities and Abilities ES.1

1 Demonstrate creativity and innovation. ES.1.1

2 Demonstrate critical thinking and problem solving. ES.1.2

3 Demonstrate initiative and self-direction. ES.1.3

4 Demonstrate integrity. ES.1.4

5 Demonstrate work ethic. ES.1.5

B Demonstrating Interpersonal Skills ES.2

6 Demonstrate conflict-resolution skills. ES.2.6

7 Demonstrate listening and speaking skills. ES.2.7

8 Demonstrate respect for diversity. ES.2.8

9 Demonstrate customer service skills. ES.2.9

10 Collaborate with team members. ES.2.10

C Demonstrating Professional Competencies ES.3

11 Demonstrate big-picture thinking. ES.3.11

12 Demonstrate career- and life-management skills. ES.3.12

13 Demonstrate continuous learning and adaptability. ES.3.13

14 Manage time and resources. ES.3.14

15 Demonstrate information-literacy skills. ES.3.15

16 Demonstrate an understanding of information security. ES.3.16

17 Maintain working knowledge of current information-technology (IT) systems. ES.3.17

18 Demonstrate proficiency with technologies, tools, and machines common to a specific occupation. ES.3.18

19 Apply mathematical skills to job-specific tasks. ES.3.19

20 Demonstrate professionalism. ES.3.20

21 Demonstrate reading and writing skills. ES.3.21

22 Demonstrate workplace safety. ES.3.22

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D Examining All Aspects of an Industry ES.4

23 Examine aspects of planning within an industry/organization. ES.4.23

24 Examine aspects of management within an industry/organization. ES.4.24

25 Examine aspects of financial responsibility within an industry/organization. ES.4.25

26 Examine technical and production skills required of workers within an industry/organization. ES.4.26

27 Examine principles of technology that underlie an industry/organization. ES.4.27

28 Examine labor issues related to an industry/organization. ES.4.28

29 Examine community issues related to an industry/organization. ES.4.29

30 Examine health, safety, and environmental issues related to an industry/organization. ES.4.30

E Addressing Elements of Student Life ES.5

31 Identify the purposes and goals of the student organization. ES.5.31

32 Explain the benefits and responsibilities of membership in the student organization as a student and in professional/civic organizations as an adult. ES.5.32

33 Demonstrate leadership skills through participation in student organization activities, such as meetings, programs, and projects. ES.5.33

34 Identify Internet safety issues and procedures for complying with acceptable use standards. ES.5.34

F Exploring Work-Based Learning ES.6

35 Identify the types of work-bABF1ed learning (WBL) opportunities. ES.6.35

36 Reflect on lessons learned during the WBL experience. ES.6.36

37 Explore career opportunities related to the WBL experience. ES.6.37

38 Participate in a WBL experience, when appropriate. ES.6.38

G Applying Safety in Engineering Studies ES.7

39 Demonstrate knowledge of appropriate personal safety procedures. ES.7.39

40 Comply with safety rules in laboratory activities. ES.7.40

41 Define risk and safety. ES.7.41

H Examining the Engineering Profession ES.8

42 Describe how engineering and technology have significantly influenced contemporary society and the environment. ES.8.42

43 Research an application of emerging technologies that may have significant influence on contemporary society and the environment. ES.8.43

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44 Explain how ethical behavior of engineers is essential to the betterment of society. ES.8.44

45 Examine how intellectual property is treated in the engineering world. ES.8.45

I Practicing Engineering Fundamentals ES.9

46 Perform a case study analysis. ES.9.46

47 Communicate engineering ideas using computer applications. ES.9.47

48 Demonstrate research techniques and strategies used by engineers. ES.9.48

49 Evaluate the safety of designs. ES.9.49

50 Reverse-engineer a product, process, or idea. ES.9.50

51 Create an algorithm to solve an engineering problem. ES.9.51

52 Demonstrate teamwork skills necessary for success when working in a technological team. ES.9.52

J Exploring Mathematics and Science Concepts in Engineering Applications ES.10

53 Identify physics concepts that are key to designing mechanical systems. ES.10.53

54 Explore physics and mathematical concepts that are key to designing electrical and computer systems. ES.10.54

55 Identify the chemistry concepts that are key to thermodynamic systems. ES.10.55

56 Identify biology and chemistry concepts that are key to engineered biological and/or environmental systems. ES.10.56

K Applying the Engineering Design Process ES.11

57 Identify the need for a product or system. ES.11.57

58 Explain the validity of designing alternative solutions to an engineering design problem or challenge. ES.11.58

59 Identify the specifications of the design problem. ES.11.59

60 Generate multiple solutions to the design problem. ES.11.60

61 Justify an optimal solution to the design problem. ES.11.61

62 Create a model or prototype for the chosen solution. ES.11.62

63 Create a test plan based on specifications. ES.11.63

64 Test the solution to the design problem. ES.11.64

65 Evaluate the test results. ES.11.65

66 Modify the solution to the design problem, if needed. ES.11.66

67 Test the modification/alternative solution, if needed. ES.11.67

68 Maintain documentation. ES.11.68

69 Present a solution. ES.11.69

L Communicating Fundamental Information ES.12

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70 Communicate with stakeholders to inform requirements. ES.12.70

71 Present an oral technical report on an engineering project. ES.12.71

72 Write a business letter to request information or materials. ES.12.72

73 Identify the different types of models available to engineers. ES.12.73

74 Explain the benefits and limitations of modeling and simulation. ES.12.74

75 Use rapid prototyping to develop models. ES.12.75

76 Create a model or simulation for an engineering product, process, or idea. ES.12.76

M Exploring Career Opportunities in Engineering ES.13

77 Explore career opportunities for engineering graduates, both within and outside the field of engineering. ES.13.77

78 Examine the breadth of topics within an engineering plan of study. ES.13.78

79 Participate in a mock interview. ES.13.79