Virginia CTE

Unmanned Aircraft Systems, Advanced (2023)

Demonstrating Personal Qualities and Abilities	1	Demonstrate creativity and innovation. 1
	2	Demonstrate critical thinking and problem solving. 2
	3	Demonstrate initiative and self-direction. 3
	4	Demonstrate integrity. 4
	5	Demonstrate work ethic. 5
Demonstrating Interpersonal Skills	6	Demonstrate conflict-resolution skills. 6
	7	Demonstrate listening and speaking skills. 7
	8	Demonstrate respect for diversity. 8
	9	Demonstrate customer service skills. 9
	10	Collaborate with team members. 10
Demonstrating Professional Competencies	11	Demonstrate big-picture thinking. 11
	12	Demonstrate career- and life-management skills. 12
	13	Demonstrate continuous learning and adaptability. 13
	14	Manage time and resources. 14
	15	Demonstrate information-literacy skills. 15
	16	Demonstrate an understanding of information security. 16
	17	Maintain working knowledge of current information-technology (IT) systems. 17
	18	Demonstrate proficiency with technologies, tools, and machines common to a specific occupation. 18
	19	Apply mathematical skills to job-specific tasks. 19

	20 Demonstrate professionalism. 20
	21 Demonstrate reading and writing skills. 21
	22 Demonstrate workplace safety. 22
Examining All Aspects of an Industry	23 Examine aspects of planning within an industry/organization. 23
	24 Examine aspects of management within an industry/organization. 24
	25 Examine aspects of financial responsibility within an industry/organization. 25
	26 Examine technical and production skills required of workers within an industry/organization. 26
	27 Examine principles of technology that underlie an industry/organization. 27
	28 Examine labor issues related to an industry/organization. 28
	29 Examine community issues related to an industry/organization. 29
	30 Examine health, safety, and environmental issues related to an industry/organization. 30
Addressing Elements of Student Life	31 Identify the purposes and goals of the student organization. 31
	32 Explain the benefits and responsibilities of membership in the student organization as a student and in professional/civic organizations as an adult. 32
	33 Demonstrate leadership skills through participation in student organization activities, such as meetings, programs, and projects. 33
	34 Identify Internet safety issues and procedures for complying with acceptable use standards. 34
Exploring Work-Based Learning	35 Identify the types of work-based learning (WBL) opportunities. 35
	36 Reflect on lessons learned during the WBL experience. 36
	37 Explore career opportunities related to the WBL experience. 37
	38 Participate in a WBL experience, when appropriate. 38
Introduction to Unmanned Systems	39 Describe the goals of an unmanned system. 39
	40 Describe the types of UxS. 40
	41 Research careers related to UxS. 41

Introducing Unmanned Aircraft Systems (UAS)	42 Explain the design of UAS. 42
	43 Identify elements of UAS. 43
	44 Research careers related to UAS. 44
	45 Identify milestones in the history of UAS. 45
Flying a UAS	46 Devise a UAS flight plan. 46
	47 Demonstrate a safe UAS flight. 47
	48 Explain how flight planning prevents flight problems. 48
	49 Describe UAS registration. 49
	50 Identify appropriate UAS credentials. 50
	51 Identify support technology for UAS flight. 51
Understanding the Subsystems of UAS	52 Identify the subsystems of a UAS. 52
	53 Identify types of air vehicles. 53
	54 Describe the essential elements needed to maintain vehicle control. 54
Identify the Components and Subcomponents of UAS	55 Describe the powerplant components of UAS. 55
	56 Describe the avionics components of UAS. 56
	57 Describe the function of the powerplant components. 57
	58 Describe the function of the avionics components. 58
	59 Identify the airframe and landing gear. 59
	60 Examine different airframe configurations. 60
Understanding the Basics of National Airspace	61 Describe the role of the FAA. 61
	62 Use Low Altitude Authorization and Notification Capability (LAANC) to identify controlled airspace. 62
	63 Describe waivers. 63
	64 Explain the requirements and process for registering sUAS vehicles with the FAA. 64

	65 Identify penalties for a drone operator for failure to adhere to P art 107 regulations. 65
	66 Identify the three classifications of flying in airspace. 66
Understanding the Basics of Weather	67 Demonstrate how to interpret a current weather report when planning UAS flight. 67
	68 Explain the weather's effect on flight performance. 68
Understanding the Basics of UAS Sensors	69 Define sensors. 69
	70 Research sensor types. 70
	71 Infer sensor requirements from scenarios. 71
Collecting, Analyzing, and Editing Data	72 Capture data using a UAS platform. 72
	73 Edit data collected from a UAS platform. 73
	74 Demonstrate how to download data from sensors. 74
	75 Analyze data from sensors. 75
	76 Create a defined deliverable. 76
Exploring Solutions for Flight Problems	77 Create solutions for common flight problems. 77
	78 Perform mission planning. 78
Identifying Motors and Batteries	79 Describe the motors used on UAS. 79
	80 Describe the use of battery connector and wires. 80
	81 Describe lithium polymer (LiPo) batteries. 81
	82 Describe how to safely use LiPo batteries. 82
Soldering and Building a Drone	83 Explain the need for soldering. 83
	84 Demonstrate the proper use of soldering tools. 84
Troubleshooting and Repairing	85 Describe safe practices in repair and handling of UAS components. 85
	86 Repair circuits. 86

Designing and Building UAS	**87** Compute the thrust-to-weight ratio goal of the UAS. 87
	88 Design a UAS. 88
	89 Build a UAS. 89
Mounting Payload and Sensors	**90** Select a UAS to meet objectives. 90
	91 Identify necessary sensors for a mission. 91
	92 Describe the payload sensor's effect on performance. 92
	93 Demonstrate the attachment of a sensor. 93
	94 Describe advanced payload deployment. 94
Recordkeeping and Maintaining Logs	**95** Document configuration changes in a maintenance log. 95
	96 Document the mission in the flight log. 96
Managing Security Threats	**97** Describe the importance of identifying cybersecurity threats on sUAS. 97
	98 Maintain proper storage of all components. 98
Demonstrating Autonomous Flight	**99** Identify the benefits of using autonomous flight modes. 99
	100 Meet with stakeholders/clients. 100
	101 Determine what software will be used. 101
	102 Update the software and firmware, if necessary. 102
	103 Perform autonomous flight. 103
	104 Process data. 104
	105 Create a model from data. 105
	106 Provide customer with deliverables. 106
Analyzing Advanced Data Products	**107** Analyze red, green, blue (RGB) sensor data. 107
	108 Analyze near-infrared (NIR) sensor data. 108
	109 Analyze multispectral sensor data. 109
	110 Analyze thermal sensor data. 110
	111 Analyze LIDAR, radar, or sonar sensor data. 111

112 **Review processed maps and data.** 112

113 **Prepare technical report.** 113