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ACQUISITION RESEARCH PROGRAM
DEPARTMENT OF DEFENSE MANAGEMENT
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Defense Civilian Training Corps (DCTC) Integrated Curriculum and Development Pilot-0 Implementation

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Abstract

The FY 2023 DoD Consolidated Appropriations Act, enacted on December 29, 2022, provides funding for DCTC pilot program implementation with the purpose to prepare college students for “Department of Defense careers relating to acquisition, digital technologies, critical technologies, science, engineering, finance, and other civilian occupations determined by the Secretary of Defense,” under the auspices of OUSD(A&S). The DoD commissioned the Acquisition Innovation Research Center (AIRC) to (a) convene a DCTC Execution Planning Panel to provide recommendations for program implementation, and (b) to develop and execute a pilot DCTC program. Pilot-0 has been implemented as a 2-year program at four land grant universities namely, North Carolina A&T State University, Purdue, University of Arizona, and Virginia Tech in the fall semester 2023, attracting a cohort of 89 rising junior scholars enrolled in 45 different majors. The DCTC Integrated Curriculum and Development (ICAD) philosophy is founded on the principle of seamlessly integrated multidimensional learning experiences and includes the following five elements: (1) a core curriculum; (2) project-based cohort summer internships; (3) action (immersive) learning experiences; (4) innovation capstone projects; and (5) a culture of care. This paper presents our experiences in designing and implementing the five ICAD elements within the DCTC Pilot-0 program execution. This includes the unique integration of the five ICAD elements, the challenges and initial lessons learned, program assessment metrics and process, and the results of the first round of assessment of the scholar learning outcomes. This integrated



education and development approach is consistent with aligning, engaging, and preparing students for a robust career in public service earlier in their academic journey.

Introduction

There is an overwhelming recognition in recent years by the highest levels of U.S. national leadership of the need for significant targeted investments in the people of the defense enterprise to achieve a highly skilled, innovative, modern, and resilient civilian workforce. The rationale, justification, and urgency of this can be found in many reports including: *2022 Defense Business Board*, *POTUS 2022 National Security Strategy*, *POTUS 2021 Management Agenda Vision*, *2022 National Defense Strategy (SECDEF)*, and *2022–2026 DASD (CPP) Human Capital Operating Plan*. This highly critical need has compelled the U.S. Congress and OUSD(A&S) to fund and launch the DCTC pilot program.

DCTC is an integrated education and development program with a mission *“to develop a highly skilled talent pipeline to fill critical skill gaps in DoD occupations related to acquisition, digital technologies, critical technologies, science, engineering, and finance. Investing in high-performing students through a prestigious scholarship and accelerated career development program to keep pace in the great power competition.”* In September 2022, AIRC commissioned the DCTC Execution Planning Panel to develop recommendations for program implementation. The panel report provided 30 recommendations, which serve as a guide to the philosophy, design, and implementation of the DCTC program (Korfiatis et al., 2023). Although the original plan was to start Pilot-1 implementation in the fall of 2024, upon request of the sponsor, AIRC proceeded with Pilot-0 implementation starting in the fall semester of 2023. Pilot-0 is being implemented as a 2-year program at four land grant universities namely, North Carolina A&T State University, Purdue, University of Arizona, and Virginia Tech, attracting a cohort of 89 rising junior scholars enrolled in 45 different majors. AIRC manages the design, development, and implementation of the DCTC pilot program through four main working groups (WGs) namely, the Curriculum WG, the Student Management WG, the Strategic Partnering WG, and the Strategic Communications WG.

The overarching goal of the pilot is to develop, test, optimize, and transition the DCTC program that will become the catalyst in developing the next generation of a highly skilled DoD civilian workforce and leaders in future areas of critical acquisition-related needs. This goal is achieved by:

- a. Partnering with top tier academic institutions and DoD organizations to recruit talented (STEM and non-STEM) undergraduate students and create a unique learning and skill development ecosystem.
- b. Providing students with scholarships and stipends for a DoD service commitment.
- c. Guiding scholars through a rigorous, cohort-based educational and experiential development program.
- d. Helping scholars transition into satisfying and rewarding DoD careers.

The scholar preparation is achieved through the unique DCTC Integrated Curriculum and Development (ICAD), which is the focus of this paper.

The DCTC Integrated Curriculum and Development (ICAD)

The DCTC-ICAD philosophy is founded on the principle of multidimensional learning experiences that, by design, are seamlessly integrated. The ICAD includes five major elements, depicted in Figure 1, and they include a core curriculum, project-based cohort summer



internships, action (immersive) learning experiences, a culture of care, and innovation capstone projects. In designing the ICAD, the AIRC Curriculum WG placed an equal emphasis and value on the importance of classroom-based learning and experiential learning acquired by working on real-life, DoD-relevant projects. Consistent with this philosophy, the AIRC Curriculum WG has selected four guiding attributes that are interwoven throughout all ICAD elements and are intended to sharpen the DCTC scholar skills and qualities in leadership, effective teamwork, critical thinking, and creativity and innovation.

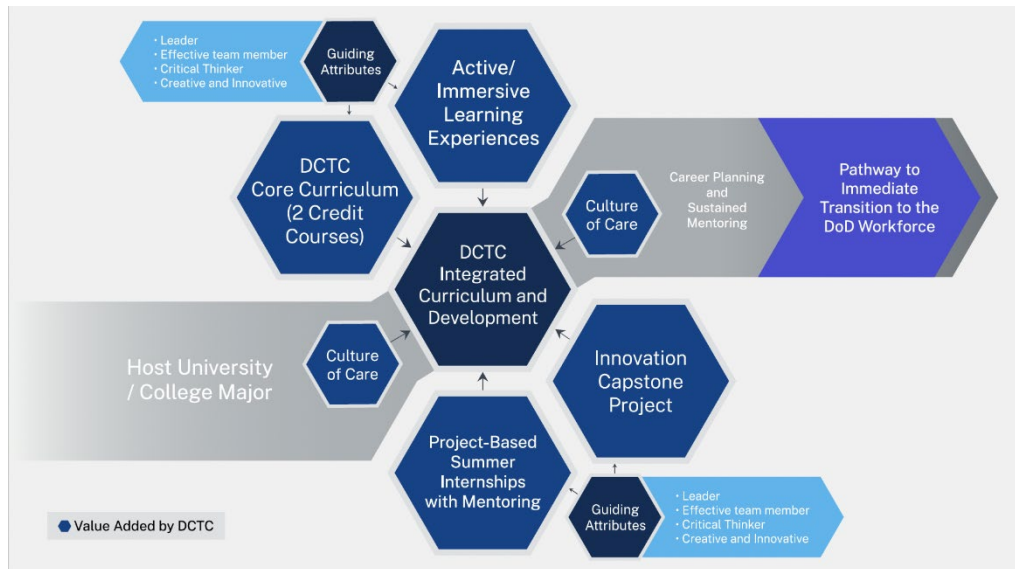


Figure 1. Elements of the DCTC Integrated Curriculum and Development

1. The Core Curriculum: The Pilot-0 core curriculum is composed of four two-credit courses given in the junior and senior years. They are:

- ***DCTC-301 (Fall 2023): Fundamentals of Civilian Service in the DoD***

This course is intended to introduce the students to fundamental principles of the DoD mission, structure, operations, and culture and give them a sense of what it takes to become a successful DoD employee. Topics include, but are not limited to, DoD organization, authorities, and responsibilities; mission and structure of military services; the DoD innovation and acquisition ecosystem and what it takes to develop and deliver an operational capability; critical technologies and their importance to the DoD strategic mission; and the importance of multidisciplinary, diverse teams in providing innovative solutions to future DoD challenges.

- ***DCTC-302 (Spring 2024): Exploration of the DoD Acquisition Environment***

This course builds on DCTC-301 and is intended to introduce the students to the fundamental roles and analytical processes applied throughout the acquisition process. The topics are presented from the perspectives of various stakeholders in the acquisition process including end users, program managers, vendors, contracting professionals, and members of the integrated product teams. The course also introduces students to the practice of self-awareness and provides exercises to strengthen resilience skills, which will improve their capacity to handle unexpected challenges and adapt to change. In this course, faculty use an active learning method of teaching, including role-playing exercises, games, and case studies.



- **DCTC-401 (Fall 2024): Overview of DoD Missions and Community Functions**

This course builds on DCTC-301 and DCTC-302 and places emphasis on emerging threats and security concerns that shape DoD strategic drives and mission, the role the DoD community plays in supporting the U.S. national security mission, and the structure, functions, and culture of the broader defense community. It also examines relationships with both internal and external stakeholders—including other DoD departments and agencies, the U.S. Congress and other government organizations, U.S. global allies, the defense industry, and academia. In addition, the course explores the vital role that technology plays in the acquisition process and the challenges and opportunities that the acquisition community faces now and in the near future. Also, in this semester student groups will start working on their innovation capstone project, sharpening their innovation, team-building, and leadership skills.

- **DCTC-402 (Spring 2025): Driving Institutions to Success**

This is the final course in the DCTC program and builds on the prior three courses with emphasis on personnel management, leadership, project management, how to overcome adversity, and how to navigate and be effective within the DoD organizational bureaucracy. In addition, students will undertake a deep dive into the 14 DoD critical technologies and will develop an understanding of the important role these technologies play in supporting the U.S. national security mission. In addition, students will have the opportunity to focus on critical leadership skills development in preparation for a career in the DoD acquisition community. Finally, student groups will complete and present their innovation capstone project to the DoD sponsors.

Table 1. DCTC-301 Course Syllabus

1	Week	Modules	JUNIOR YEAR
2	Fall		DCTC-301
3	0	Orientation	Full Disclosure: What am I getting into? Opportunities, expectations, principles, ethics, rewards, and sense of purpose from government employment.
4	1	Government: Authorities and Policies, Structures, Ethics, and Rewards	Gov't overview: Legislative & Executive Branches. Pres. Budget Requests. Authorization (NDAA, HASC, SASC w/ Service subcommittees) and Appropriations (Acts, HAC-D, SAC-D). GAO Audits & bid protest. CRS. CBO.
5	2		Executive Branch: POTUS, OMB. President's Budget Request. Agencies. Authorities, responsibilities, limitations (checks & balances)
6	3		DoD: Organization, authority, responsibility, Titles 10 and 50, 4th Estate (OSD, Defense Agencies), Military Departments and Services.
7	4		Legislation and Policy Sources: Legislative: Acts, NDAA's, committee reports, JES. US Code. Code of Federal Regulations. FAR & DFARS. DoD policy: WHS archive (DoDDs, DoDIs, memos), CJCS, FMR, Service Policy.
8	5	Military Structures	Military structures, responsibilities, and culture
9	6	Military Structures	Military operations: CCMDs, chain of command
10	7		Allied considerations
11	8	Workforce and Team Basics	Personnel basics: Hiring, billets, career fields, MIL/CIV/CTR, Acquisition workforce demographics and training
12	9		Team building, IPTs, operation, cooperation, and compromise
13	10	Innovation and Acquisition	Acquisition basics: Requirements, financial resources, technology, intelligence, and acquisition
14	11		Government-industry-academia collaborations and partnerships
15	12	Tech. Literacy and Implications for Business	Data literacy
16	13		Data, data sources, and decision analytics
17	14		AI Literacy
18	15		Other Tech. Literacy: Current priority modernization areas (hypersonics, quantum, 5G, etc.)



The following steps are taken to ensure maximum uniformity on the content and delivery of each course among the four pilot universities:

1. The AIRC Curriculum WG develops a detailed lesson outline for each weekly lecture, which contains the learning objectives, sample quizzes, and class discussion topics and provides them to the university instructors teaching the course ahead of time. In addition, the WG provides the faculty with media collateral (videos/podcasts) relevant to the material covered in the lecture.
2. The AIRC Curriculum WG meets with the university course instructors on a weekly basis to discuss various issues including lessons learned and to make decisions for going forward.

A solicitation was sent to various DoD organizations to participate in sponsoring the DCTC scholar internships for the summer of 2024. The solicitation resulted in an overwhelming response with a total of 37 internship project proposals submitted by DoD organizations. The requirements that must be satisfied by the sponsoring organizations for the DCTC internship program are shown in Table 3.

Table 2: DCTC-301 Learning Objectives that Students Must Demonstrate

Week	Modules	Scholar Learning Objectives (SLO)	GUIDING ATTRIBUTES
1	MODULE 1 (Lectures 1-4) Orientation Government: Authorities and Policies, Structures, Ethics, and Rewards	<input type="checkbox"/> SLO-0: Basic understanding of the opportunities, expectations, principles, ethics, rewards, and sense of purpose with government employment. <input type="checkbox"/> SLO-1: Basic understanding of DoD structure, organization, authorities, responsibilities and relationships with the executive and legislative branches <input type="checkbox"/> SLO-2: Basic knowledge of DoD related policies and policy development process	<input type="checkbox"/> Leadership <input checked="" type="checkbox"/> Critical Thinking <input type="checkbox"/> Effective Team Member <input checked="" type="checkbox"/> Creativity and Innovation
2			
3			
4			
5	MODULE 2 (Lectures 5-7) Military Structures	<input checked="" type="checkbox"/> SLO-3: Basic understanding of military services, missions, structures, responsibilities, operations and culture	
6			
7	MODULE 3 (Lectures 8-9) Workforce and Team Basics	<input type="checkbox"/> SLO-4: Basic understanding of personnel management, training, and teaming	
8			
9	MODULE 4 (Lectures 10-11) Innovation and Acquisition	<input checked="" type="checkbox"/> SLO-5: Understanding of the DoD innovation and acquisition ecosystem, structures, and opportunities to innovate	
10			
11	MODULE 5 (Lectures 12-15) Tech. Literacy and Implications for Business	<input checked="" type="checkbox"/> SLO-6: Technological literacy in DoD critical areas including priority tech modernization areas, and the implications for business functions	
12			
13			
14			
15			

Semester Critical Thinking Team Project
SLO-7: The students demonstrate that can function in a team setting and they have a good grasp of team dynamics and functions including roles and responsibilities, conflict management and team effectiveness

3. **Action/Immersive Learning Experiences (ALEs):** ALEs entail “hackathon”-type, scholar team competitions and projects on rapid, DoD-related problem solving and are aligned with the DCTC curriculum. ALEs are designed to help scholars hone their skills in areas such as
 - a. How to be creative and innovate within the DoD innovation ecosystem
 - b. How to listen and communicate effectively and how to pitch their ideas
 - c. How to function effectively as a member of a cross-functional team



- d. How to appreciate leadership and the attributes, responsibilities, and values of leaders
- e. How to think critically and understand trade-offs
- f. How to solve problems within the bounds of ethical conduct

ALEs are executed over 2-3 consecutive full days. Pilot universities have the option to use the CDAO-offered ALE learning activities or create their own to fulfill DCTC minimum curricular requirement for one ALE per year.

Table 3: DCTC Requirements for Developing and Executing Summer Internships

Requirement	Description
Address Critical DoD Skills	Critical DoD skills are further developed in a project setting; applies elements from DCTC curriculum
Multi-disciplinary	Requires efforts of a multi-disciplinary team effort and collaboration
Cohort-based	Cohorts of DCTC scholars from a university or across DCTC pilot universities work as a team
Challenging problem	Problem space should represent a sample of DoD's compelling problems and mission sets
Representative work	Work represents the type of work assigned to a junior DoD civilian in that organization
Mentor network	Availability and role of a mentor network for both project and general scholar development
Support staff/processes	Support staff and processes facilitate a top caliber experience
Pathway to assignment	Proposing organization(s) have the ability to offer post-graduation employment
Culture of care	Environment and experience embody the DCTC culture of care

AIRC has created the DCTC Acquisition Game to support the objectives of ALEs. The game provides scholars an immersive experience into the basic processes of the defense acquisition system and is composed of three phases: a technical solution phase, a contracting approach phase and a program management phase. These phases allow scholars to gain an understanding of the various decision points, the key information needed, the critical thinking required and the challenges that can be



experienced through the life cycle of a typical acquisition program. The DCTC scholars start using the acquisition game in DCTC-302.

4. Culture of Care: The Culture of Care element of ICAD helps scholars to sharpen their personal qualities, traits, values, and attributes and develop a reliable compass to navigate an increasingly uncertain, complex, and volatile world. The Culture of Care relies on a mentor network composed of experienced leaders from the DoD, other federal agencies, academia, and industry, who act as role models for DCTC scholars, and mentor them throughout their studies and beyond. The first members of the DCTC culture of care mentor community are the DoD leaders who sponsor the summer internship projects and will host and mentor the scholars in their organizations. Also, the university instructors who teach the courses are experienced in various aspects of DoD functions and serve as student mentors. Mentoring and coaching scholars on shaping their personal leadership skills and qualities in areas that include the following:

- Passion for what you do and ability to inspire others
- Integrity and professional ethics
- Balanced temperament
- Engendering respect and loyalty
- Thought leadership
- Fair, just, unbiased, transparent, clear values
- Compassion and empathy for others
- Mental toughness
- Resiliency and adaptability
- Balance between family and job obligations

Awareness of these values and leadership attributes is included within the core curriculum courses. For example, resiliency and adaptability are embedded in DCTC-302.

5. Innovation Capstone Projects: Innovation Capstones are multidisciplinary undergraduate team projects where students engage to formulate solutions to meet the needs of customers in the Department of Defense. These span the two senior year semesters. Students pursue projects using technical, managerial, and entrepreneurial tools and methods. Each Innovation Capstone project is formulated by two student teams. The “*Solution Team*” focuses on the application of engineering and science to support conceptualization, modeling and design, technical analysis, fabrication, integration, and testing of prototyped solutions in response to the identified need. The “*Business Team*” addresses business dimensions on each project such as ensure the requirements are well understood; develop and track cost and schedule estimations; conduct a competitive analysis, if necessary; formulate and manage risks; conduct a supply chain and manufacturability assessment to ensure an ability to scale the solution, if necessary; and formulate an intellectual property assessment, if necessary. Each capstone project team will be funded by the DCTC program to cover costs of supplies, materials, and incidentals as required and not exceeding \$10,000 per project.

With support from the DCTC/AIRC team, the pilot universities have multiple pathways to formulate topics for Innovation Capstone projects namely:

- Engage with any DoD organization to formulate a project/need. Some project ideas have been developed by the AIRC team, but the universities are not constrained by these ideas.
- Leverage the project ideas that have been identified by NSIN (National Security Intelligence Network). This will be facilitated by a DCTC partnership with NSIN that



allows their existing model to identify potential capstone projects and DoD organizations.

- Extending the DCTC summer internship project. The DoD organizations believe there are some summer project-based internships that will need a second phase of research and prototype development. The senior year capstone project will be the perfect transition from the summer into senior year capstones.

The participating universities agree to assign faculty advisors as required to guide and manage both the technical and business teams for each topic. The faculty advisors and the scholar teams have the following major responsibilities:

- Establish and maintain periodic contact with the government customer and innovation capstone managers by phone calls, emails, virtual meetings, and personal visits as required.
- Write a project plan in accordance with template provided by AIRC.
- Conduct research, development, and business operations necessary to meet project objectives.
- Present periodic design reviews to government points of contact as agreed in the project plan.
- Present a final project review containing the following:
 - A final status review of all project elements to the government customer and innovation capstone managers.
 - Final deliverables including a) final project review documents, including a final project plan and “quad chart”, b) copies of a final report (as required by the university), c) all relevant technical/business data and analyses, d) demonstrations as required, and e) short executive summary of the project in video format.

In addition, each team is given the opportunity to enter their projects in a year-end competition.

DoD Critical Skills Areas

AIRC has recently completed a research study (Ramirez-Marquez, 2024) to identify and develop a list of what various DoD organizations and project reports consider as areas of critical skill and capability needs in the broader acquisition space. The study identified 80 published reports relevant to critical skills and talent development in DoD acquisition and used Natural Processing Language (NPL) techniques to perform analyses and extract information on skills and capabilities described in the documents. Based on these analyses, the investigator developed summaries of the report conclusions and plausible clusters of skill sets were identified through meta-analysis across the 80 reports. The study has identified 14 skill and capability sets that are considered critical in developing the future DoD acquisition workforce (Table 4). This list serves as a guide in developing and executing the DCTC-ICAD.



Table 4. DoD Acquisition Workforce Critical Skills and Capabilities

Critical Skills and Capabilities	
Leadership Skills, Adaptability, and Strategic Thinking – communications and stakeholder engagement; collaborative training, knowledge sharing, and cross-capability training; adaptive communication, learning, and skill-capability development.	Agile Procurement – develop skills in agile procurement processes to acquire and deploy new capabilities; enhance capabilities to source and integrate cutting-edge solutions.
Cognitive Skills in Cyber Space – analysis and evaluation of cyber exploits and risks; design and risk; using encryption algorithms and security tools; cyber operations.	Innovative Ecosystem – foster an environment that encourages innovation, experimentation, and rapid prototyping; foster professionals who can bridge gaps between technical and strategic aspects.
Digital Tools and Transformation – role of automation and AI in business operations and warfare; workforce enhancement and efficiency.	Policy and Intervention – develop effective policies and interventions to improve digital inclusivity and address digital skill difficulties.
Data Analytics and Insights – impact on organizational performance; decision making.	Enhanced Technical Proficiency – artificial intelligence; autonomy; cyberspace; software; digital literacy in general.
Cybersecurity and Network Design	Communication Skills – oral; written; interpersonal.
Resilience and Adaptability – enhance resilience to withstand crises; adapt to changing circumstances; develop skills to cope with stress.	Interdisciplinary Knowledge and Skills – encouraging individuals to acquire knowledge and skills from multiple disciplines, fostering a holistic approach to problem-solving and innovation.
Public-Private Partnerships; International Engagement	Ethical and Social Responsibility – understanding the ethical implications of technology and developing a sense of responsibility toward society.

The DCTC-AIRC team is in the process of validating and refining this list of critical skills and capabilities with partner DoD organizations that are hosting the scholar summer internships.

Consistent with the philosophy of placing equal value and emphasis on classroom facilitated learning and experiential learning, and the mission to prepare scholars for future leadership positions in the DoD workforce, the DCTC-ICAD is designed to address the full spectrum of knowledge, skills, and abilities (KSAs) in critical areas. KSAs have been used by the DoD for hiring purposes. They involve the understanding acquired by study or experience, the ability to perform a job because it has been practiced, and the physical or mental power to execute tasks. Attributes bring to play higher order personal characteristics and qualities that are more difficult to acquire by study. Attributes can be thought of as qualities that are made up by a collection of KSAs in combination with a collection of critical interpersonal characteristics leading to the concept of knowledge, skills, abilities, and attributes (KSAs). Figure 2 shows how the five elements of the DCTC-ICAD are designed to provide a holistic preparation of scholars for leadership positions in the DoD by combining KSAs with shaping their interpersonal leadership skills.



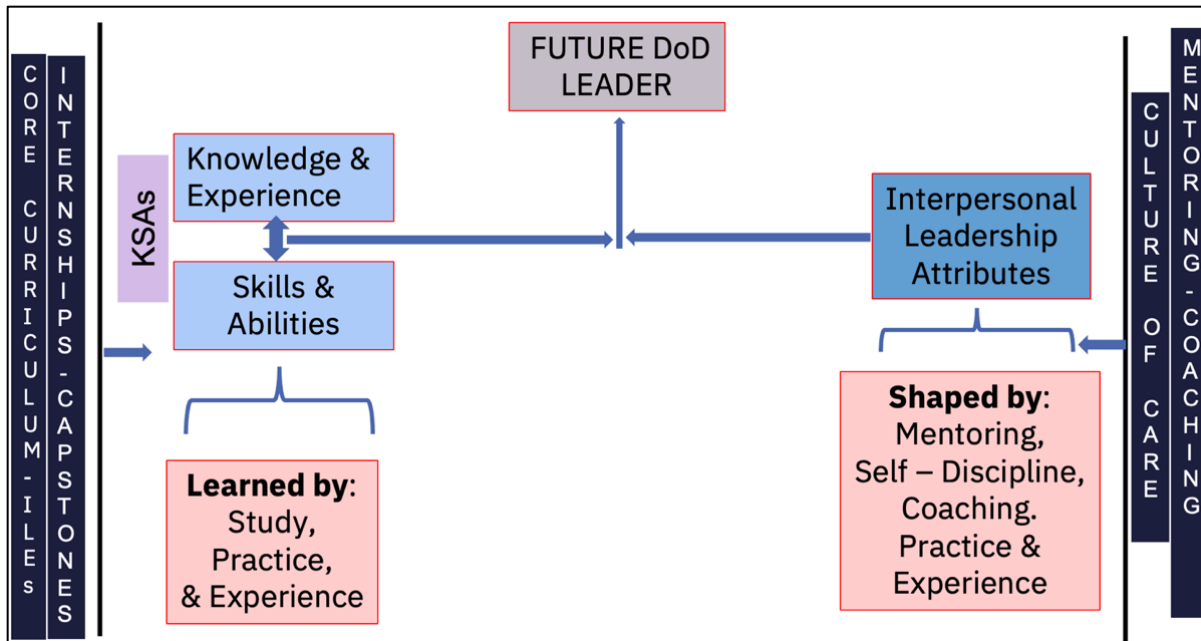


Figure 2. KSAs and Interpersonal Leadership Attributes

Cohort-0 Scholar Academic Profile

Table 5 shows the diversity of the DCTC Cohort-0 scholars' fields of undergraduate study mapped against the OUSD(A&S) critical functions namely, auditing, business-financial management and cost estimating, contracting, engineering and technical management, life-cycle logistics, program management, and test and evaluation. Approximately 60% of the scholars are pursuing STEM fields and 40% non-STEM degrees.

The student selection for Cohort-0 was performed by each university based on the following selection requirements:

- U.S. citizenship required
- Cumulative Grade Point Average (GPA) higher than 3.0 on a scale 0–4
- Eligibility to obtain a security clearance
- Personal interview assessment by a selection committee

Table 5. Undergraduate Scholars' Majors Mapped to A&S Functions

STEM Disciplines (<i>A&S Functions</i>) (60% of Cohort-0)	Non-STEM Disciplines (<i>A&S Functions</i>) (40% of Cohort-0)
<p>Engineering & Technology (<i>PM, SE, Test and Evaluation, Sustainment, Energy</i>)</p> <ul style="list-style-type: none"> ▪ Aeronautical and Astronautical Engineering ▪ Aerospace Engineering ▪ Chemical Engineering ▪ Industrial and System Engineering ▪ Mechanical Engineering 	<p>Business and Management (<i>Policy, Contracts, Budgets, PM, Acquisition, Sustainment, Industrial Base, Supply Chains</i>)</p> <ul style="list-style-type: none"> ▪ Accounting ▪ Business Information Technology ▪ Business Management ▪ Economics and Finance ▪ Management ▪ Marketing ▪ Supply Chain Management ▪ Technology Leadership & Innovation



<p>Human Factors, Life Sciences, Medicine, and Health (<i>Human Factors, T&E, Health Systems and Data, Chem-Bio Defense, Environment, Animal Systems</i>)</p> <ul style="list-style-type: none"> ▪ Biochemistry & Biology ▪ Biological Engineering ▪ Biomedical Engineering ▪ Biosystems Engineering ▪ Human Nutrition ▪ Psychology ▪ Veterinary Science 	<p>Public Policy (<i>Policy, NSS/NDS, Leg. Affairs, Public Affairs</i>)</p> <ul style="list-style-type: none"> ▪ Political Science ▪ Public Health & Political Science
<p>Computer and Information Systems (<i>Software, Data Science, T&E, SE, Sustainment, Logistics</i>)</p> <ul style="list-style-type: none"> ▪ Computer & Information Technology ▪ Computer Engineering ▪ Computer Graphics Technology ▪ Computer Modeling & Data Analytics ▪ Computer Science ▪ Electrical and Computer Engineering ▪ Software Engineering 	<p>National Security (<i>Policy, Requirements, Threats, Intel.</i>)</p> <ul style="list-style-type: none"> ▪ Chinese ▪ National Security & Foreign Affairs
<p>Design and Construction (<i>Installations & Environment, Housing, Real Property, Construction</i>)</p> <ul style="list-style-type: none"> ▪ Building Construction ▪ Construction Management Technology ▪ Industrial Design ▪ Landscape Architecture ▪ Geo-Science ▪ Urban Planning 	<p>Law (<i>Policy, Contracts, A&S, Leg. Affairs, OGC</i>)</p> <ul style="list-style-type: none"> ▪ Criminal Justice ▪ Criminology ▪ Digital Criminology

Table 6 shows the average scholar GPA for each of the university cohorts. The overall GPA average across the four universities is 3.64, which demonstrates that the DCTC program is capable of attracting very high performing, bright students.

Table 6: Average GPA for Each University Scholar Cohort

University	Number of Students	Average GPA
North Carolina A&T	20	3.68
Purdue	20	3.67
University of Arizona	19	3.65
Virginia Tech	30	3.56

DCTC Program Assessment

The AIRC-DCTC team has adopted an evidence-based process of assessment, evaluation, and continuous improvement for the ICAD modeled after the Accreditation Board of Engineering and Technology (ABET) assessment guidelines (www.ABET.org). The process consists of three loops of assessment:

- Loop I: Closes at the Course Level
- Loop II: Closes at the Program Level
- Loop III: Closes at the DCTC Mission Level



The process is shown in Figure 3 and consists of the following: (a) The course loop (I) of assessment is the sole responsibility of the course instructor, who evaluates student mastery of the course learning objectives and proposes course improvements; (b) the program loop (II) of assessment relies on input from various stakeholders such as scholar employers, the program external advisory board, and program alumni to evaluate how well the five elements of ICAD program meet the program educational and development objectives; and (c) the DCTC mission loop (III) is informed by the results of the program evaluation and maps the program evaluation results to the DCTC mission to assess if the stated mission is achieved. Continuous improvement initiatives are implemented as necessary.

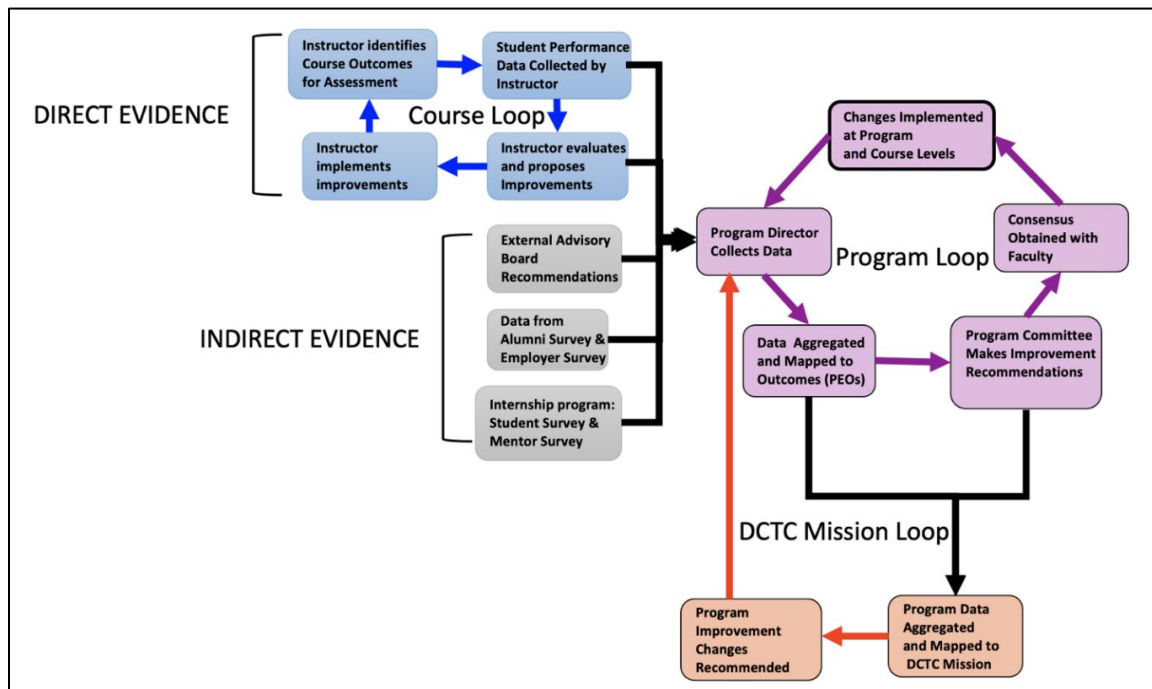


Figure 3. DCTC-ICAD Program Assessment Flow Chart

The following definitions are used in the assessment process:

Student Learning Objectives (SLOs): These are the learning objectives at the course level developed and approved by the DCTC curriculum committee. An example for DCTC-301 is shown in Table 2.

1. **Student Outcomes (SOs):** These are the skills and abilities the students are expected to have mastered at the time of graduation from the DCTC program. DCTC scholars' performance is monitored and evaluated to ensure that student outcomes are met. The SOs for the DCTC-ICAD program are ability to identify critical DoD challenges and formulate innovative solutions by applying fundamental principles.
2. Ability to communicate effectively with a range of audiences within the national defense and security ecosystem.
3. Ability to recognize ethical and professional responsibilities and make informed judgments while considering impacts of their work in global, political, environmental, economic, and societal contexts.
4. Ability to navigate with ease through the national defense and security broader enterprise by understanding the culture, structure, operations, and functions of the

federal and private defense and security communities and their missions, roles, and responsibilities.

5. Ability to function effectively on cross-functional teams whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. Ability to acquire and apply new knowledge as needed using appropriate learning strategies including pursuing graduate degrees.

Program Educational Objectives (PEOs): These are broad statements that describe what graduates are expected to attain within a few years of graduation. PEOs must be consistent with the DCTC mission, which is aligned with DoD needs. PEOs are periodically reviewed and modified to meet the various DoD constituency needs in critical areas. The PEOs for the DCTC-ICAD program are:

PEO-1: Benefitting from the ICAD program, DCTC scholars will advance much faster in their DoD careers and will reach higher levels of achievement than non-DCTC graduates in similar fields that are employed at the same time with only a bachelor's degree.

PEO-2: DCTC scholar graduates will fill gaps in critical areas and will have a positive impact on the DoD workplace through multidisciplinary/cross-functional collaboration, teamwork, innovation, and leadership.

PEO-3: DCTC program graduates will effectively navigate important contextual factors in their careers, including the historical, regulatory, political, policy, economic, ethical, public relations, and technological aspects of DoD future challenges.

Assessment of DCTC-301

The AIRC team has performed an evaluation of DCTC-301, the first course of Pilot-0 phase of the program, completed in the fall 2023 semester. The following outcomes were of particular interest to the curriculum committee:

1. Student level of satisfaction with respect to the course content, instructional methods, and instructional materials used.
2. Student level of satisfaction with the instructor and the way the material was presented in the classroom.
3. Instructors' assessment of how well students demonstrated their level of mastery of the course learning objectives.
4. Students' opinions on how well they think they mastered each course learning objective.
5. Degree of uniformity of 1 through 4 above among the four universities participating in the Pilot-0.

The assessment process involves four steps: (1) the administration of an online student survey with questions designed to assess items 1, 2 and 4 above; (2) a direct assessment of student outcomes by each instructor on the level of mastery of the SLOs by the entire class; (3) a report by each instructor on lessons learned and proposed improvements; and (4) analysis of the data and course evaluation performed by the curriculum committee. This process results in evidence-based implementation of continuing improvement initiatives at the course level.

The student survey contained eight questions about course content and quality, six questions about instructor performance in class, and a self-assessment of student mastery of each course learning objective. The student response rate ranged from 63% to 100% across the four universities with an average rate of 84.3%. The survey was anonymous and invited the students to make written comments.



Student Course Evaluation. For the eight course assessment areas, the students rated each area on a Likert scale of 5 (strongly agree) to 1 (strongly disagree), producing the results shown in Table 7.

Table 7. Student Course Evaluation Ratings

Statement	Average Rating	Range
The material was instructive	4.2	4.0-4.6
The class discussions helped me understand the material	4.2	3.4-4.8
The assignments/quizzes were graded promptly	4.3	3.6-4.8
Quiz questions related highly to the course material	3.8	3.0-4.6
The videos were motivating and helpful in better understanding the lecture topics	3.7	3.0-4.5
The class group project was helpful in understanding DoD issues	4.1	3.5-4.5
The guest speakers were effective in making me understand the material better	4.3	4.0-4.7
Overall, the course was a great experience	4.1	3.7-4.8

The students also submitted 32 comments addressing issues with the course. Figure 4 shows the variability of the rating scores for the last statement across the four universities (color-coded).

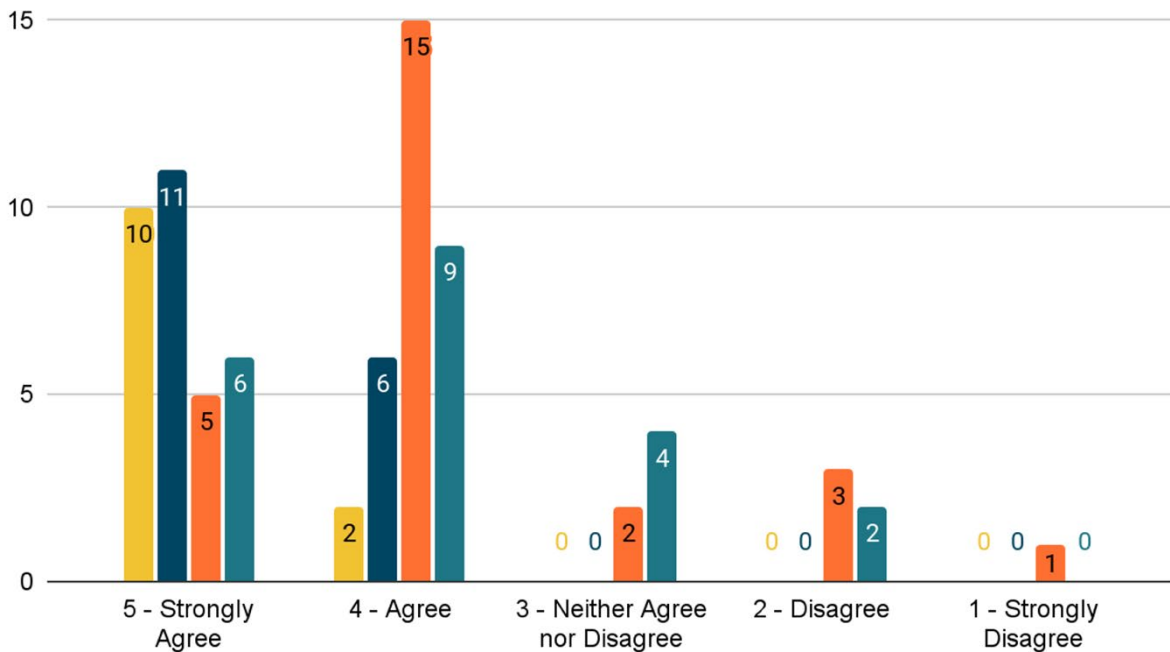


Figure 4. Student Ratings on the Statement "Overall, the course was a great experience."



Student Instructor Evaluation. For the six instructor assessment areas, the students rated each area on a Likert scale of 5 (strongly agree) to 1 (strongly disagree), producing the results shown in Table 8.

Table 8. Student Instructor Evaluation Ratings

Statement	Avg. Rating	Range
The course objectives and grading policy were clearly explained	4.4	3.6-4.9
The instructor was prepared for class	4.6	4.0-5.0
The instructor was successful at communicating the material	4.6	4.2-5.0
The instructor was successful at engaging the students in class discussion	4.5	4.3-4.8
The instructor was available to the students	4.7	4.4-5.0
Overall, the instructor was very effective	4.6	4.1-4.9

The students also submitted 14 comments addressing issues with the course instructors. Figure 5 shows the variability of the rating scores for the last statement across the four universities.

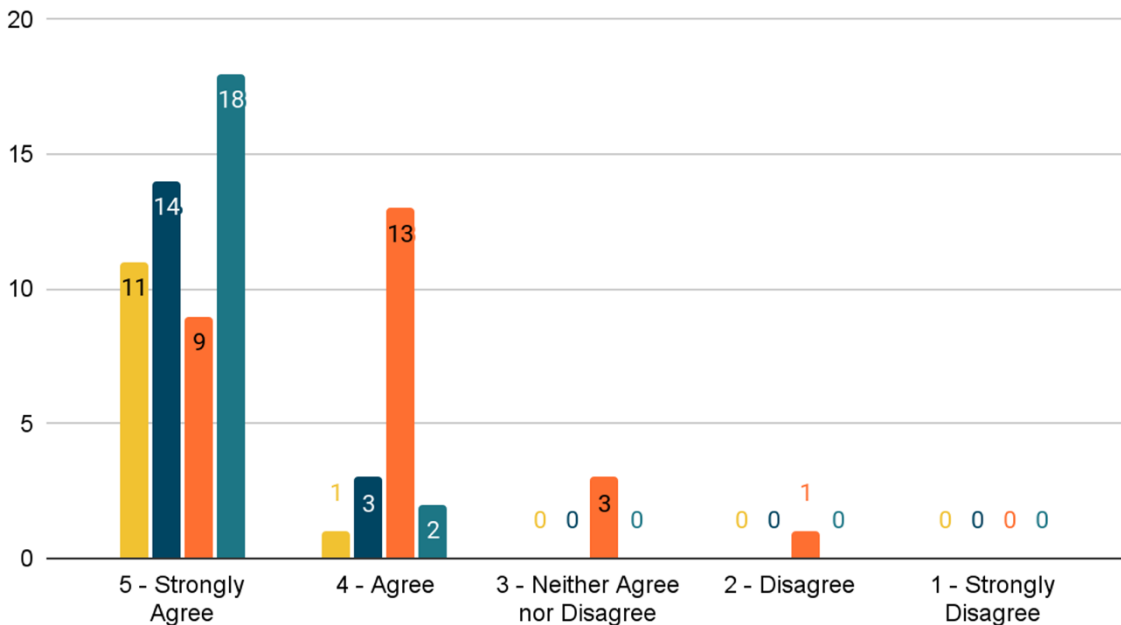


Figure 5. Student Ratings on the Statement "Overall, the instructor was very effective."

Evaluation of Student Learning Outcomes (SLOs). The SLOs for the class were evaluated by the course instructors at each university based on student performance as tested by various assessment instruments including quizzes, essays, project presentations, and class participation.



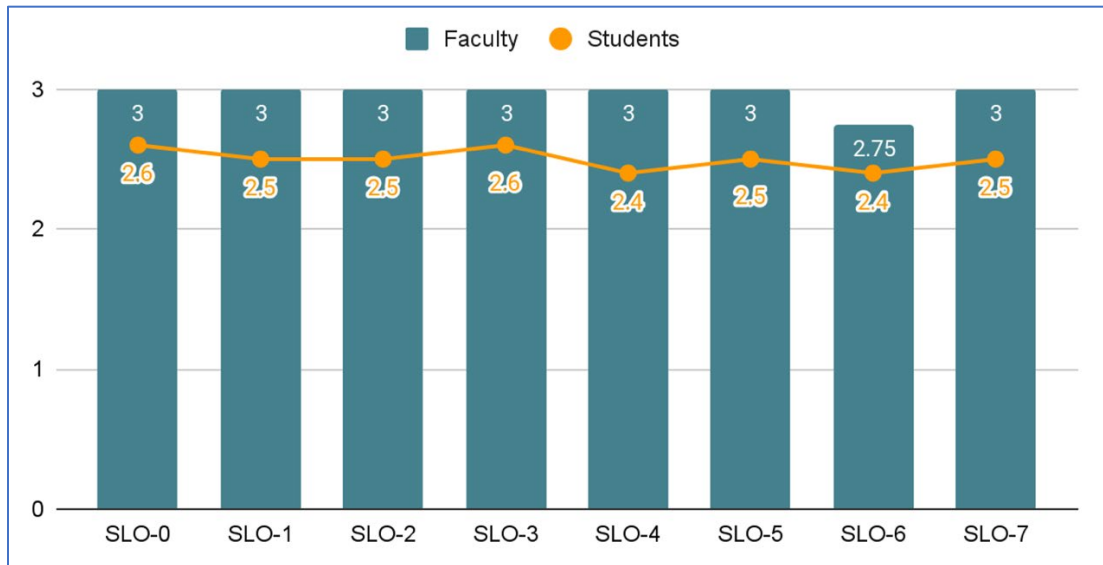


Figure 6. Assessment of SLOs by Instructors and Students

In addition, the survey asked students to rate their perception of the mastery they achieved in each of the eight learning objectives. A scale of 3 (high), 2 (medium) and 1 (low) was used representing the 75th, 50th, and 25th percentiles respectively. Figure 6 shows the responses of the instructors' SLOs assessment plotted along with the students' SLO mastery self-evaluation. The average faculty rating of all SLOs across the four universities was 2.97, where the student self-evaluation was very consistent with an average rating of 2.5.

The results of the DCTC-301 assessment presented herein, along with several recommendations made by both students and course instructors, have resulted in several changes to be made with the purpose of improving both this course as well as the remaining three courses of the program. Some of these changes have already been implemented in the DCTC-302 course offered in the spring 2024 semester.

Conclusion

The DCTC is a highly selective program attracting bright and highly motivated students and preparing them to seamlessly enter the DoD acquisition workforce and have impactful careers leading into future leadership positions. The DCTC pilot program provides a rare opportunity to develop, test, evaluate, and continuously improve a novel, innovative integrated curriculum and development program that places equal weight on classroom learning and on learning through cohort-based problem solving and project execution on real, current, and future DoD challenges. The ICAD program is designed to develop a talent pool with the knowledge, skills, abilities, and personal attributes required to maintain the United States in a global leadership position for the next generations. The vision is that DCTC scholar cohorts will form a distinctive, cohesive, and strongly bonded community during their studies and throughout their professional careers and will carry their DCTC affiliation as a badge of honor and distinction for life.

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References


- DASD(CPP). (2022). *Fiscal year 2022 – fiscal year 2026 DoD civilian human capital operating plan*. https://www.dcpas.osd.mil/sites/default/files/DoD%20HCOP%20FY22-26_3%20June%202022%20%28003%29.pdf
- Defense Business Board. (2020). *Strengthening defense department civilian talent management*. <https://dbb.defense.gov/Portals/35/Documents/Reports/2022/DBB%20FY22-03%20Talent%20Management%20Study%20Report%2018%20Aug%202022%20-%20CLEARED.pdf>
- DoD. (2022). *National defense strategy*. <https://media.defense.gov/2022/Oct/27/2003103845/1/-1/1/2022-NATIONAL-DEFENSE-STRATEGY-NPR-MDR.PDF>
- Korfiatis, G. P., et al. (2023). *Defense Civilian Training Corps (DCTC) implementation recommendations*. DCTC Execution Planning Panel Report, Acquisition Innovation Research Center (AIRC).
- POTUS. (2022). *National security strategy*. <https://www.whitehouse.gov/wp-content/uploads/2022/10/Biden-Harris-Administrations-National-Security-Strategy-10.2022.pdf>
- POTUS. (2021). *Management agenda vision*. https://assets.performance.gov/PMA/Biden-Harris_Management_Agenda_Vision_11-18.pdf
- Ramirez-Marquez, H. E. (2024). *Leveraging NPL for skill identification and talent management in the Department of Defense* [Report]. Acquisition Innovation Research Center (AIRC).

APPENDIX A: Core Curriculum Modules and Learning Objectives for DTC-302, 401, and 402

 DCTC-302: Exploration of the DoD Acquisition Environment															
Week	Modules	Scholar Learning Objectives	GUIDING ATTRIBUTES												
1	MODULE 1 (Lectures 1-11) • Acquisition Principles, Functions and Processes	SLO-1: Understanding project management, risk management, and basic acquisition processes and functions	Semester Critical Thinking Team Project SLO-3: The students demonstrate they can function in a team setting and they have a good grasp of team dynamics and functions including roles and responsibilities, conflict management and resolution and team effectiveness	Leadership											
2		SLO-2: Understanding basic systems engineering principles and value of the systems engineering process to DoD acquisition			Critical Thinking										
3						SLO-3: Understanding the value chain of technology research and development, test and evaluation, production, and fielding	Effective Team Member								
4								SLO-4: Understanding the way the DoD industrial base operates, logistics, supply chain management and risks							
5									SLO-5: Understanding science and technology implications for project management and contracting, intellectual property and operations and support of the military						
6										SLO-6: Understanding security threats and the regulatory and ethical responsibility of personal and DoD security and security clearances	Creativity and Innovation				
7												SLO-7: Orientation on key ethics requirements, restrictions, and philosophy of government employees			
8													MODULE 2 (Lectures 12-13) • Cross-Functional Implications		
9														MODULE 3 (Lectures 14-15) • Security and Ethics	
10															
11															
12															
13															
14															
15															



 DCTC-401: Overview of DoD Missions and Community Functions					
Week	Modules	Scholar Learning Objectives	GUIDING ATTRIBUTES		
1	MODULE 1 (Lectures 1-5) • DoD Mission	SLO-1: Understanding the fundamental national security mission and objectives: Why are we here?	Leadership		
2		SLO-2: Understanding DoD culture, strategic drivers, concerns and challenges		Critical Thinking	
3			SLO-3: Understanding the decomposition into communities and their roles, responsibilities, authorities, and equities		Effective Team Member
4					
5		SLO-5: Understanding how communities differ and how those differences can cooperate (or not!) to support national security			
6	SLO-6: Understanding the impact of cooperation with various communities on the acquisition process				
7					
8					
9					
10					
11	MODULE 2 (Lectures 6-15) • Communities Roles and Equities	SLO-7: The students demonstrate they can function in a team setting, can think 'out of the box', can take risks and innovate	Creativity and Innovation		
12					
13					
14					
15					

 DCTC-402: Driving Institutions to Success				
Week	Modules	Scholar Learning Objectives	GUIDING ATTRIBUTES	
1	MODULE 1 (Lectures 1-3) • Workforce	SLO-1: Understanding DoD personnel management policies and processes, and career planning	Leadership	
2		SLO-2: Understanding DoD culture, strategic drivers, concerns and challenges		Critical Thinking
3			SLO-3: Acquire knowledge and experience on how to work effectively in a cross-disciplinary team environment, manage conflicts and be a good leader as well as a good follower	
4	SLO-4: Understand the basic principles of managing people	Creativity and Innovation		
5				SLO-5: Acquire knowledge on how to navigate and be effective amidst organizational bureaucracy
6			SLO-6: Acquire knowledge about the importance of selected emerging technologies and why they are critical to DoD's current and future national defense strategy.	
7				
8				
9				
10				
11	MODULE 2 (Lectures 4-5) • Leadership and Management	Service, rewards, endurance, and perseverance; Farewell Keynote; Innovation Capstone Presentation and Competition	Creativity and Innovation	
12				
13				
14				
15				





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