THE UNIVERSITY OF ARIZONA

New Academic Program Workflow Form

General

Proposed Name: Network Operations

Transaction Nbr: 00000000000135

Plan Type: Specialization

Academic Career: Undergraduate

Degree Offered: Undergraduate Certificate

Do you want to offer a minor? N

Anticipated 1st Admission Term: Fall 2023

Details

Department(s):

UAZS

DEPTMNT ID	DEPARTMENT NAME	HOST
2910	College of Applied Science and Technology	Y

Campus(es):

ONLN

LOCATION	DESCRIPTION
ONLN	Online

Admission application terms for this plan: Spring: Y Summer: N Fall: Y

Plan admission types:

Freshman: N Transfer: N Readmit: N Graduate: N

Non Degree Certificate (UCRT only): Y

Other (For Community Campus specifics): N

Plan Taxonomy: 11.0901, Computer Systems Networking and Telecommunications.

Program Length Type: Program Length Value: 0.00

Report as NSC Program:

SULA Special Program:

Print Option:

Diploma: Y Network Operations Certificate

Transcript: Y Network Operations Certificate

Conditions for Admission/Declaration for this Major:

No requirements.

Requirements for Accreditation:

N/A

Program Comparisons

University Appropriateness

he proposed program is consistent with the following CAST strategic plan:
Objective: Build world class infrastructure and effective organizational structure
Objective: Mentor, retain, and motivate faculty who deliver world class, 4th IR education and undergraduate research
Objective: Recruit, advise, and inspire diverse, post-traditional, transfer students to impact our region and the world
Objective: Develop & deliver rigorous & relevant applied education and research

Arizona University System

NBR	PROGRAM	DEGREE	#STDNTS	LOCATION	ACCRDT
1	Appl Computing emph Netwk Ops	BAPS	52	UArizona, Southern AZ & ONLN	Y

Peer Comparison

see attached

Faculty & Resources

Faculty

Current Faculty:

INSTR ID	NAME	DEPT	RANK	DEGREE	FCLTY/%
00634016	Henry Werchan	2910	Assit. Prof. Pract.	Master of Science	.50
22082752	Gurmindersingh Khalsa	2910	Adj. Assit. Prof	Master of Science	.25

INSTR ID	NAME	DEPT	RANK	DEGREE	FCLTY/%
22089405	Patrick Heming	2910	Adj. Assit. Prof	Master of Science	.25

Additional Faculty:

One additional FTE required starting in year 2 consistent with the program growth.

Current Student & Faculty FTE

DEPARTMENT	UGRD HEAD COUNT	GRAD HEAD COUNT	FACULTY FTE
2910	1060	0	5.00

Projected Student & Faculty FTE

	UGRD HEAD COUNT			GRAD HEAD COUNT			FACULTY FTE		
DEPT	YR 1	YR 2	YR 3	YR 1	YR 2	YR 3	YR 1	YR 2	YR 3
2910	15	30	50	0	0	0	5.00	6.00	6.00

Library

Acquisitions Needed:

None

Physical Facilities & Equipment

Existing Physical Facilities:

Online classes currently offered.

Additional Facilities Required & Anticipated:

None required.

Other Support

Other Support Currently Available:

Existing support staff will support program.

Other Support Needed over the Next Three Years:

No additional support staff required

Comments During Approval Process

3/25/2022 8:54 AM
PAULEWAGNER

Comments
Approved.

7/22/2022 11:38 AM

ESANDMAR

Comments
Updated budget form for AIB; removed Distance since college admin has indicated they wish to be ONLN only. Contacted ODCE and they have not approved the launch of this program so will reach out to proposing college and have them submit for review to ODCE first.

10/28/2022 3:31 PM

MELANIECMADDEN

Comments
Uploaded letter of support from ONLN campus

NETWORK OPERATIONS CERTIFICATE PROPOSAL

Note: New programs requiring a program fee must have the fee approved prior to implementation.

I. CERTIFICATE DESCRIPTION–provide a marketing description for the proposed certificate. Include the purpose (preparation for professional certification exams, degree program recruitment, or employability enhancement), nature, and program highlights. The description must match departmental and college websites, Degree Search & Academic Advisement Reports / Graduate Catalog and Program Descriptions page, handouts, promotional materials, etc.

The 18-credit hour Network Operations Certificate will provide undergraduate students with the experience and training to develop the engineering and operational skills required to create, operate and defend complex computing and information networks. The program curriculum includes theory, operational labs, modern network architecture, advanced routing and switching, systems administration, cloud computing, network defense, wireless networking and network security. Security is a prevailing theme across all of these areas of study. Network Operations graduates are prepared to take on a wide variety of IT-related positions in the private, public and government sectors.

II. NEED FOR THE CERTIFICATE/JUSTIFICATION - describe how the certificate fulfills the needs of the city, state, region, and nation. Provide market analysis data or other tangible evidence of the need for and interest in the proposed certificate. This might include results from surveys of current students, alumni, and/or employers or reference to student enrollments in similar programs in the state or region. Include an assessment of the employment opportunities for graduates of the program during the next three years. Curricular Affairs can provide a job posting/demand report by skills obtained/outcomes/CIP code of the proposed certificate. Please contact the Office of Curricular Affairs to request the report for your proposal.

Initially, we will target students in our own programs (e.g., BAS in Applied Computing and BAS in Cyber Operations). Students currently enrolled in the BAS in Applied Computing with an emphasis in Network Operations cannot pursue this certificate.

a. Anticipated Enrollment and General Demand:

According to the U.S. Bureau of labor statistics, the demand for network and computer systems administrators will continue to increase at 5% annually through 2030, with over 350,000 jobs available in 2020. The 2020 median pay for this position is over $80,000 annually.

This certificate program will target:

- corporate partners that have established agreements for the BAS in Applied Computing as an alternative option for those organizations
- industry professionals seeking to improve their skills and/or increase their eligibility for promotion
- students interested in augmenting their current degree program with skills such as information management, data visualization, and data analysis

Source: https://www.bls.gov/ooh/computer-and-information-technology/network-and-computer-systems-administrators.htm

3- Year Projected Annual Enrollment:

- 1st Year, 15 students enrolled

- 2nd Year, 30 students enrolled
- 3rd Year, 50 students enrolled

Expected enrollment in these certificates is based on an analysis of comparable certificates at peer institutions, existing CAST certificates, and enrollment in related emphasis areas.

b. Needs Served by the Certificate

According to an article in CIO Magazine, the 10 most in-demand jobs for 2022 all focus around network and computer systems administrators and include: Database administrator/architect, Information security analyst, network and computer administrator, computer and information systems manager, systems analysis, and network/cloud architect.
Source: https://www.cio.com/article/230935/hiring-the-most-in-demand-tech-jobs-for-2021.html

Related Positions:
- System/network administrator
- Network engineer
- Network analyst
- Network/security designer
- Network manager
- Network operations
- Incident response analyst

Local worksites for computing students include:
- Raytheon Technologies
- Intel
- Synacor

III. PROGRAM AFFILIATION- specify whether the UA offers an affiliated program at the undergraduate or graduate level. The affiliated program may or may not have the same name as the proposed certificate. Will there be any collaboration with other departments or universities to maximize resources? If there is collaboration, please include a memo (email is acceptable) of support from the applicable parties.

BAS in Applied Computing emphasis in Network Operations

IV. CERTIFICATE REQUIREMENTS– complete the table below to list the certificate requirements, including minimum number of credit hours, required core, electives, and any special requirements. Information in this section must be consistent throughout the proposal documents (comparison chart, department checklists, curricular/assessment map, etc.).

UNDERGRADUATE CERTIFICATE
Requirements should include sufficient units to provide a substantive program and an appropriate level of academic rigor and in no case be less than 12 units of credit.

Minimum total units required	18
Minimum upper division units	18
Total transfer units that may apply to the certificate. *Note: A minimum of six*	6

(6) units used to complete the certificate must be University credit.	
Pre-admissions expectations (i.e., academic training to be completed prior to admission)	None
Certificate requirements. List all certificate requirements including core and electives. Courses listed must include **course prefix, number, units, and title**. **Mark new coursework (New)**. Include any limits/restrictions needed. Provide email(s)/letter(s) of support from home department head(s) for courses not owned by your department.	**NETV 370 (3) Intro to Network Design and Architecture**. An introduction to modern network design and architecture. Students will learn modern network design and network architecture concepts, security in modern networks, the cost of modern networks, software defined networks (SDN), network virtualization framework (NVF), quality of service (QoS) and quality of experience concepts (QoE), Internet of Things (IoT) and Cloud infrastructures. **NETV 371 (3) Network Security Principles**. In-depth coverage of current risks and threats to an organization's information including methods of addressing the safeguarding of these critical assets. Coverage includes theoretical and historical background necessary to understand the various risks and hands on techniques for working in the security field. **NETV 374 (3) Routing: Theories and Applications**. Course focuses on both theoretical and application concepts of IP addressing techniques, intermediate routing protocols, command line interface configuration of switches, and VLANS. **NETV 375 (3) Advanced Routing and WAN Technologies**. Course focuses on both theoretical and application concepts advanced IP addressing techniques including Network address translation, port address translation, and DHCP. Wan terminology and technology to include: PPP, ISDN, Frame Relay and overall network management. **NETV 379 (3) Cloud Computing**. Course covers the theory and application of cloud computing, including Cloud Computing network design and connectivity, server management, best-practices, security, and provider service level agreements. Case studies of industry examples are used as applications to reinforce the discussed theories. **NETV 479 (3) Advanced Cloud Computing**. Course reviews theory and application of cloud computing. It builds upon this and delves into advanced cloud computing concepts including virtualization, containerization, microservices, cloud storage and programming, software defined architectures (compute, storage and networking), and advanced cloud security. There is a significant application of hands-on exercises to give the student a practical understanding of these advanced topics.

Internship, practicum, applied course requirements (Yes/No). If yes, provide description.	No
Any double-dipping restrictions (Yes/No)? If yes, provide description. *A maximum of 6 units may double-dip with a degree requirement (major, minor, General Education) or second certificate.	Yes, 9 units maximum.
Additional requirements (provide description)	

V. CURRENT COURSES–using the table below, list all existing courses included in the proposed certificate. You can find information to complete the table using the UA course catalog or UAnalytics (Catalog and Schedule Dashboard> "Printable Course Descriptions by Department" On Demand Report; right side of screen). If the courses listed belong to a department that is not a signed party to this implementation request, upload the department head's permission to include the courses in the proposed certificate and information regarding accessibility to and frequency of offerings for the course(s). Upload letters of support/emails from department heads to the "Letter(s) of Support" field on the UAccess workflow form. Add rows to the table, as needed. **New course proposals must be submitted via UAccess Course Add forms following the procedures and deadlines detailed here.**

Course prefix and number (include cross-listings)	Units	Title	Pre-requisites	Modes of Delivery (online, in-person, hybrid)	Campus and Location Offered	Dept signed party to proposal? (Yes/No)
NETV 370	3	Intro to Network Design & Architecture		Online		Yes
NETV 371	3	Network Security Principles		Online		Yes
NETV 374	3	Routing: Theories and Applications		Online		Yes
NETV 375	3	Advanced Routing & WAN Technologies	NETV 374	Online		Yes
NETV 379	3	Cloud Computing		Online		Yes
NETV 479	3	Advanced Cloud Computing	NETV 379	Online		Yes

VI. **Learning Outcomes** - Complete this table as a summary of the learning outcomes from your assessment plan, using these examples as a model. If you need assistance completing this table and/or the Curriculum Map, please see the resources at the Office of Instruction and Assessment or contact them here.

Learning Outcome #1: Students will be able to critically analyze networking concepts and assess their applicability to real world scenarios.
Concepts: Students will apply networking concepts learned in core courses.
Competencies: Students will demonstrate critical analysis skills.

Learning Outcome #2: Students will be able to communicate effectively orally and in writing.
Concepts: Students will effectively communicate networking concepts learned in core courses.
Competencies: Students will demonstrate effective written and oral communication skills.
Learning Outcome #3: Students will develop the engineering and operational skills required to create, operate and defend complex computing and information networks.
Concepts: Students will design and engineer network architectures to meet operational business requirements.
Competencies: Students will demonstrate complex network architectures in a simulation environment.

VII. CONTACTS AND ADMINISTRATION

UNDERGRADUATE (delete if n/a)

a. List the name and contact information for the primary point of contact for the certificate:

Henry Werchan, Program Director, Applied Computing, werchanh@arizona.edu

b. List the name and contact information for the person or persons who will serve in the role of Director of Undergraduate Studies (DUS) for the certificate (this is not always the same as the DUS for affiliated programs or head of the managing academic unit.):

Linda Denno, Dean of Faculty and Academic Affairs, ldenno@arizona.edu

c. If known, list the members of the certificate oversight committee for this certificate. Note: undergraduate certificate oversight committees shall consist of a minimum of 3 members, 2 of which are faculty and at least one of the 2 is participating faculty in the certificate program. The oversight committee is responsible for 1) qualifications of participating faculty, 2) coordination of admissions recommendations with the Office of Admissions, and 3) curricular changes:

Paul Wagner, Department Head, Department of Applied Technology, paulwagner@arizona.edu
Henry Werchan, Program Director, Applied Computing, werchanh@arizona.edu
Li Xu, Professor, College of Applied Science and Technology, lxu@arizona.edu

VIII. REQUIRED SIGNATURES

Program Director/Main Proposer (print name and title):
Henry Werchan, Program Director, Applied Computing
Program Director/Main Proposer signature:
Date:
Henry Werchan Mar 21, 2022

Department Head (print name and title):
Paul Wagner, Department Head, Department of Applied Technology
Department Head's signature:
Date:

Mar 21, 2022

Associate/Assistant Dean's signature:
Date: Linda L Denno

Linda L Denno Mar 21, 2022

Dean (print name):

Gary A Packard Jr

Date:

Gary A Packard Jr Mar 23, 2022

For use by Curricular Affairs (Undergraduate):

Committee	Approval date
APS	
Undergraduate Council	
Undergraduate College Academic Administrators Council	

Network Operations Prgm_ UCERT CERTG_2022_FINAL

Final Audit Report 2022-03-23

Created:	2022-03-22
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Agreement completed.

2022-03-23 - 11:57:59 PM GMT

THE UNIVERSITY OF ARIZONA

BUDGET PROJECTION FORM

Name of Proposed Program or Unit: Network Operations Certificate

Budget Contact Person: Henry Werchan	Projected 1st Year 2022 - 2023	2nd Year 2023 - 2024	3rd Year 2024 - 2025	
METRICS				
Net increase in annual college enrollment UG	15	30	50	Expected increase in certificate seeking students
Net increase in college student credit hours (SCH) UG	270	540	900	Enrollment increase * 3 hours per course * 6 courses
Net increase in annual college enrollment Grad				
Net increase in college SCH Grad				
Number of enrollments being charged a Program Fee				
New Sponsored Activity (MTDC)				
Number of Faculty FTE		1		New faculty member hired in year 2
FUNDING SOURCES				
Continuing Sources				
UG Activity Informed Budgeting (AIB) Revenue	86,400	172,800	288,000	=SCH UG * $500 * 64%
Grad AIB Revenue				
Program Fee Revenue (net of revenue sharing)				
F and A AIB Revenues				
Reallocation from existing College funds (attach description)				
Other Items (attach description)				
Total Continuing	**$ 86,400**	**$ 172,800**	**$ 288,000**	
One-time Sources				
College fund balances				
Institutional Strategic Investment				
Gift Funding				
Other Items (attach description)				
Total One-time	**$ -**	**$ -**	**$ -**	
TOTAL SOURCES	**$ 86,400**	**$ 172,800**	**$ 288,000**	
EXPENDITURE ITEMS				
Continuing Expenditures				
Faculty		70,000	70,000	
Other Personnel				
Employee Related Expense		22,330	22,330	Assume 31.9% of salary
Graduate Assistantships				
Other Graduate Aid				
Operations (materials, supplies, phones, etc.)				
Additional Space Cost				
Other Items (attach description)				
Total Continuing	**$ -**	**$ 92,330**	**$ 92,330**	
One-time Expenditures				
Construction or Renovation				
Start-up Equipment				
Replace Equipment				
Library Resources				
Other Items (attach description)				
Total One-time	**$ -**	**$ -**	**$ -**	
TOTAL EXPENDITURES	**$ -**	**$ 92,330**	**$ 92,330**	
Net Projected Fiscal Effect	**$ 86,400**	**$ 80,470**	**$ 195,670**	

THE UNIVERSITY OF ARIZONA

New Academic Program
PEER COMPARISON

Select three peers (if possible/applicable) for completing the comparison chart from ABOR-approved institutions, AAU members, and/or other relevant institutions recognized in the field. The comparison programs are not required to have the same degree type and/or title as the proposed UA program. Information for the proposed UA program must be consistent throughout the proposal documents. Minors and Certificates may opt to include only 2 peer comparisons.

Program name, degree, and institution	Network Operations Certificate University of Arizona	Peer 1 Delaware County Community College	Peer 2 Technical College of the Low Country
Current number of students enrolled	[redacted]	Unknown	Unknown
Program Description	The 18-credit hour Network Operations Certificate will provide undergraduate students with the experience and training to develop the engineering and operational skills required to create, operate and defend complex computing and information networks. Courses include: NETV 370 Intro to Network Design and Architecture, NETV 371 Network Security Principles, NETV 374 Routing: Theories and Applications, NETV 375 Advanced Routing and WAN Technologies, NETV 379 Cloud Computing, NETV 479 Advanced Cloud Computing	https://catalog.dccc.edu/academic-programs/programs-study/network-engineering-certificate-competency/#curriculumtext This certificate option will provide students with a knowledge base and skill set aimed at exposing students to various types of computers and networking devices, network connectivity and communications, current industry standard client and server operating systems and networking security concepts. Courses include: Introduction to Information Technology, Microsoft	https://www.tcl.edu/academics/pathways/stem/network-engineer-certificate/ 27-credit-hour program includes instruction in networking administration, configuration, internet programming, and microprocessors. Courses include: Intro to Workstation Networking Administration, Intro to Server Networking Configuration Admin, Implementing Windows Network Infrastructure Services, Implementing and Administering Windows Directing Services, Cisco Internetworking Concepts, Designing Windows Network Security, Visual Basic Programming, Internet

		Windows 10, Network Communications, Microsoft Server 2016: Installation and Storage, Cyber and Network Security Concepts	Programming with Database, Microprocessors I
Target Careers	System/network administrator Network engineer Network analyst Network/security designer Network manager Network operations Incident response analyst	Network and Datacenter Administrator Network Infrastructure Support Network Implementation Team Network Support and Help Desks Information Security Engineer	Network engineer Computer network specialist
Emphases? (Yes/No) List, if applicable	No	No	No
Minimum # of units required	18	18	27
Pre-Major? (Yes/No) If yes, provide requirements.	No	No	No
Special requirements to declare/gain admission? (i.e., pre-requisites, GPA, application, etc.)	None	None	None

Additional questions:

1. How does the proposed program align with peer programs? Briefly summarize the similarities between the proposed program and peers, which could include curriculum, overall themes, faculty expertise, intended audience, etc.

The proposed certificate program provides a broad and comprehensive course suite that better aligns with industry requirements in this area. The other programs do have some similarities with the proposed certificate coursework, although they lack the breadth and scope of the proposed certificate, primarily from a curriculum standpoint. The other programs also appear to be largely targeted towards an administrative job suite with the University of Arizona proposed curriculum offering targeting a broader, more comprehensive network design approach.

2. How does the proposed program stand out or differ from peer programs? Briefly summarize the differences between the proposed program and peers, which could include curriculum, overall themes, faculty expertise, intended audience, etc.

   The other programs do have some similarities with the proposed certificate coursework, although they lack the breadth and scope of the proposed certificate, primarily from a curriculum standpoint. The proposed certificate program provides greater scope and context to the subject area. In particularly, the proposed certificate courses provide a broad engineering perspective to the overall program.

3. How do these differences make this program more applicable to the target student population and/or a better fit for the University of Arizona?

   The breadth and scope of the proposed program result in an offering that better maps to published job requirements. The coursework has been carefully selected to ensure a broad coverage of the subject matter. Students completing these certificate requirements will be uniquely qualified for current and future job qualification requirements.

August 5, 2022

Dear Dean Packard and Dean Denno,

Thank you for your interest in launching your program, Network Operations Undergraduate Certificate, via the Arizona Online campus.

We are pleased to inform you that your program will be available for student enrollment in the Online campus beginning Fall 2023 or later, pending curricular approval.

Here's what to expect in the coming weeks:

- You will meet with your Project Manager, Jill Hewins, to finalize the curriculum roll-out plan and online course development schedule for your program.

- Once you receive curricular affairs approval a Memorandum of Agreement (MOA) will finalize Arizona Online's partnership in your program. This program will utilize existing coursework and thus requires no course development stipends.

- As the planning process progresses, your Project Manager will connect you with additional Arizona Online resources including student recruitment, enrollment, marketing, and advising to help prepare your program for launch.

Your Project Manager will be following-up with our Onboarding Checklist to provide you with an overview of the development process. If you have questions, please contact your Arizona Online Project Manager, Jill Hewins.

We look forward to working with you and are excited to make your program available to our Online students.

Thank you and welcome to Arizona Online!

Yissel Salafsky
Director, Program Operations & Strategic Initiatives

Cc:
Dr. Craig Wilson, Vice Provost, Online, Distance, and Continuing Education
Dr Nicole Kontak, Assistant Dean, Curricular and Academic Affairs, CAST
Jill Hewins, Project Manager, Arizona Online Program Operations & Strategic Initiatives