**NWCCD Strategy 2.3: Proposed Computer Science Transfer Plan and Career Pathway – “No Options” Plan**

Developing a Career Pathway:

The most efficient way to develop career pathways under the TAACCCT Round 1 strategies selected by the Wyoming Community College Coalition was do develop Strategy 2.3 and Strategy 3.2 in tandem. Both strategies required the input of industry partners to identify key knowledge, skills, and abilities (KSAs) required by students seeking employment and the development of curricula addressing those needed skillsets. Once established, the career pathways needed under Strategy 3.2 become identical to the transfer pathways to various baccalaureate programs at four-year institutions required by Strategy 2.3, with all guesswork on the part of the student as to which courses are needed removed. After what are dubbed “No Options” pathways are documented and reviewed by program faculty and transfer specialists, they are presented to industry advisory committees for final approval.

Understanding the industry or industries for which the programs being developed under the TAACCCT grant is a critical component for determining the methods for acquiring industry input on curricula through Knowledge, Skills, and Abilities (KSA) outlines, developing context for program assessments, promotional materials for student recruitment, challenges to offering career awareness events as part of the marketing effort, and more. A thorough understanding of industry growth or retraction in the college’s service area provides a context against which the success of program can be measured.

After analyzing industry growth or retraction in a college’s service area, coupled with the determination of the largest companies and their potential hiring needs over various time scales (e.g., one-year hiring projection, two-year hiring projection, etc.), allows the TAACCCT grant team to work with local industry, program faculty, and district administration to develop career awareness events or recruiting strategies that will have the most efficacious impact.

Selection of the Computer Science baccalaureate pathway was made to test replicability of the career path and transfer plan developed under TAACCCT Round 1 for technical education programs. NWCCD does not currently offer an Associate of Applied Science specifically in Computer Science, nor is there a full Associate of Science or Associate of Arts in this discipline.

The “No Options” Student Plan:

Colleges in the state of Wyoming have significant difficulty with student retention and the completion of degree programs. At both the community college and the university level approximately one quarter to one third of students enrolled in academic programs complete their education in the projected time frame. There are several possible reasons for this low retention and completion rate.

One possibility is that, due to the state’s rural nature, the distances a student must travel combined with course scheduling may impact the ability to attend, particularly if a student is employed in one town and the class is offered elsewhere. A second possibility is the number of decisions a student must make with or without the assistance of an academic advisor regarding what classes to take; the number of options and prerequisites required to reach graduation and transfer to the university level can be confusing, particularly for a student returning to an academic environment after years outside the system. Selection of course inapplicable to a degree or transfer or overlooking a hidden prerequisite adds time from initial enrollment to graduation or transfer. This added time, particularly in a depressed economic climate where sustainable living wage work is hard to find, is a time investment some students cannot afford.

In an effort to increase student retention and completion rates while eliminating unnecessary guesswork and classroom time, the Northern Wyoming Community College District (NWCCD) TAACCCT Grant team has developed a “No Options Option” student plan for programs that align with growth industries indicated by market research. This student plan and advising process identifies all required prerequisites needed for transfer to the University of Wyoming while eliminating the possibility of a student enrolling in courses that do not meet graduation and transfer requirements, providing the clearest pathway to degree completion and a return to employment.

Targeted Student Demographic:

The “No Options Option” student plan and pathway is designed primarily for students who need to acquire or refine education in order to advance in their current job or to return to gainful employment. The student plan eliminates guesswork by advising students on what courses to take and when to take them in a clear, easy to understand format and checklist designed to eliminate a student’s need to meet with an academic advisor each semester to choose appropriate courses. While not every student wants or needs to transfer to a Bachelor’s program to achieve their academic and employment goals the “No Options” plan outlines a pathway to completing a higher degree at the University of Wyoming.

General Education Requirements, Not Including Prerequisites:

The first step in developing a No Options pathway is to ensure that the general education requirements for associate degrees are clearly identified. After speaking with students across campus on their advising experience, many indicated that the general education requirements (not including prerequisite or remedial courses) were either unclear or that the number of options available to satisfy the requirements were overwhelming.

The second step is to review the general education courses that satisfy the graduation and transfer requirements and select the ones that are most applicable to the degree path. This may include the input of a subject matter expert, such as a faculty member, to ensure the best fit for the program.

In the example below, the general education requirements were reviewed for their best applicability to a proposed Associate of Science in Geography degree and transfer pathway. Criterion for selection were based both on Wyoming’s requirements as well as applicability to the emphases in the Computer Science B.S. program offered at the University of Wyoming; where possible, courses were selected to create a latticed pathway that would allow for additional degree options while maintaining a “No Options” completion pathway. Additionally, courses were chosen for their applicability to the development of career pathways in the field of Information Technology field. Where necessary, revision recommendations for classes were made for NWCCD’s administration to increase the applicability to general education requirements.

Writing Requirement: 6 Units

English 1010 – English 1 (3 Units)

English 2010 – Technical Writing (3 Units)

Math and Quantitative Reasoning Requirement: 7-8 Units (Recommended 8 Units)

Math 1400 – Pre-Calculus Algebra (4 Units)

Computer Science 1010 – Introduction to Computer Science (3 Units)

Science Requirement: 2 Lab Sciences, 8 Units

Biology 1020 – Life Science

Physics 1050 – Concepts of Physics

Cultural Context Requirement: 6 Units for the Associate of Science

Philosophy 2300 – Ethics in Practice

Sociology 1000 – Sociological Principles

US and Wyoming Constitution: 3 Units

Political Science 1000 – American & Wyoming Government

Global Diversity Requirement:

Addressed in Cultural Context Requirement

Other Requirements: 5 Units

Communications 1030 – Interpersonal Communication

PEAC 1001 – Physical Activity and Your Health

Total General Education Units Required: 36 Units

Remaining Degree Emphasis Unit Requirements: 24

Total Degree Requirements (under Wyoming curricula revision legislation): 60

Degree Emphasis:

The Northern Wyoming Community College District currently offers four Associate of Applied Science degrees in computers: Computer Information Systems; Computer Networking Administration; Computer Web Design; and Cyber Security. The proposed transfer pathway within this document reorganizes courses currently available at NWCCD for the creation of an Associate of Science in Computer Science, restructuring courses from the current programs into emphasis for a higher level degree, with notes made for courses that need to be developed to address requirements at the University of Wyoming.

*Degree Emphasis, Computer Information Systems: 25 Units*

Computer Science 1030 – Computer Science 1 (4 Units)

**CMAP 1745 – A+ Computer Maintenance (3 Units)\***

**CSEC 1500 – Computer Network Security + (3 Units)\***

MSFT 2605 – Windows Client Operating System (3 Units)

MSFT 1520 – Windows Server Networking (3 Units)

INET 1750 – Cyber Ethics (3 Units)

CMAP 2970 – Internship (3 Units)

Computer Science 2050 – Introduction to SQL (3 Units)

*Degree Emphasis, Network Administration: 25 Units*

**CSEC 1500 – Computer Network Security + (3 Units)\***

MSFT 1520 – Windows Server Networking (3 Units)

MSFT 1530 – Managing a Microsoft Windows Environment (3 units)

IMGT 2400 – Introduction to Information Management (3 units)

CSCO 2000 – Cisco: CCNA 1 (4 units)\*

CSCO 2020 – Cisco: CCNA 2 (3 units)\*

CSCO 2025 – Cisco: CCNA 3 (3 units)\*

CSCO 2040 – Cisco: CCNA 4 (3 units)\*

*Degree Emphasis, Cyber Security: 26 Units*

CSCO 2000 – Cisco: CCNA 1 (4 units)\*

CSCO 2020 – Cisco: CCNA 2 (3 units)\*

CSCO 2025 – Cisco: CCNA 3 (3 units)\*

CSCO 2040 – Cisco: CCNA 4 (3 units)\*

MSFT 1570 – Designing Security for Windows (3 Units)

CSEC 1510 – Hardening Network Infrastructure (4 Units)

MSFT 1520 – Windows Server Networking (3 Units)

CSEC 1520 – Network Defense and Countermeasures (3 Units)

Design Notes:

1. Computer Network Security + (also known as Net +) and A+ Computer Maintenance should both be bumped up to 4 Unit courses, and added to the Science requirement (with lab) under General Education. There is a solid reason for this: both courses require (or should require) extensive lecture on Computer Science theory that is essential to perform the tasks in the work force that both courses teach. Additionally, neither of these courses can be successfully completed without a hands-on segment (lab). In the private IT education sector, both of these courses are independent certifications. Increasing the unit requirements and making them lab sciences will:

* Ensure that all Computer Science AS graduates have three core courses necessary for all IT professionals (Computer Science 1010 – Introduction to Computer Science would be required under Math and Quantitative reasoning)
* Free up unit space in degree-specific requirements for other essential competencies

1. Credit for Prior Learning awards could be granted for A+ and Net +, provided the student can present the appropriate documentation from an authorized certifier; at one time, receiving these certificates was a permanent certification, but that may have changed with advances in technology. CCNA could, possibly, also fall under the CPL initiative, but more research on the competencies behind the Cisco certificate compared to degree requirements is needed.
2. An Associate of Science in Computer Science degree is an ideal program under which to develop a one-year accelerated program utilizing hybrid delivery for the majority of courses.

Advising Tools:

The following pages provide an example of the proposed “No Options” pathways to degree completion and transfer, designed as a transfer pathway to the Computer Science Bachelor of Arts degree program at the University of Wyoming. This basic advising document was developed under TAACCCT Round 1 to act in several capacities: a “No Options” degree pathway; a degree completion checklist; and a career pathway plan.

As noted earlier, NWCCD does not currently have a Computer Science degree program; instead, four Associate of Applied Science degree programs are available for enrollment. The following student plan and checklist was developed to test the replicability of the “No Options” design concept developed and applied to the Associate of Applied Science in Mining Technology program funded under TAACCCT Round 1; however, these advising tools will be delivered to NWCCD’s advising staff upon completion of the grant as resource material in the event students indicate an interest in a career in the field of Information Technology or Computer Science.

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| --- | --- | --- | --- | --- | --- |
| **B.S. in Computer Science Pathway to the University of Wyoming, Concentration** | | | | | |
| Full Name: | | | Initial Advising Date: | | |
| Preferred Email: | | | Home Phone #: | | |
| NWCCD ID #: | | | Cell Phone #: | | |
| **General Education Requirements** | | | | | |
| **Term** | **Grade** | **Requirement** | **Term** | **Grade** | **Requirement** |
| **Writing Requirement (6 Units):** | | | **Math and Quantitative Reasoning Requirement (7-8 Units):** | | |
|  |  | English 1010 – English 1 (3 Units) |  |  | Math 2200 – |
|  |  | English 2010 – Technical Writing (3 Units) |  |  | Math 2205 – |
| **Science Requirement: 2 Lab Sciences, 8 Units** | | | **Cultural Context Requirement (6 Units)** | | |
|  |  | Physics 1310 – (4 Units) |  |  | Philosophy 2300 – Ethics in Practice (3 Units) |
|  |  | Physics 1320 – (4 Units) |  |  | Sociology 1000 – Sociological Principles (3 Units) |
| **US & WY Constitution:** | | | **Global Diversity Requirement:** | | |
|  |  | Political Science 1000 – American & Wyoming Government (3 Units) |  |  | Addressed in Cultural Context Requirement |
| **Other Requirements: 5 Units** | | | | | |
|  |  | Communications 1010 – (3 Units) |  |  | PEAC 1001 – Physical Activity and Your Health (2 Units) |
| **Associate of Science in Computer Science: 12 Units** | | | | | |
|  |  | Computer Science 1010 – Intro to Computer Science (3 Units) |  |  |  |
|  |  | Computer Science 1030 – Computer Science 1 (3 Units) |  |  |  |
|  |  | Computer Science 2050 – Introduction to SQL (3 Units) |  |  |  |
|  |  | Information Management 2400 – Intro to Information Management (3 Units) |  |  |  |
| **University of Wyoming General Education Requirements: 10 Units Required, 6 Units Unavailable at NWCCD** | | | | | |
|  |  | English 4010 – Technical Writing in the Professions (3 Units) |  |  | Foreign Language 1 (4 Units)  \*\*Program Requirement\*\* |
|  |  |  |  |  | Foreign Language 2 (3 Units)  \*\*Program Requirement\*\* |
| **University of Wyoming, Bachelors of Science in Computer Science – 39 Units, 38 Units Required** | | | | | |
|  |  | Computer Science 2030 – Computer Science 2 (4 Units) |  |  | Computer Science 4950 – Senior Design 1 (1 Unit) |
|  |  | Computer Science 2150 – Computer Organization (3 Units) |  |  | Computer Science 4955 – Senior Design 2 (2 Units) |
|  |  | Computer Science 2300 – Discreet Structures (3 Units) |  |  | Computer 4750 – Systems Programming and Management (3 Units) |
|  |  | Computer Science 3011 – Intro to Software Design (3 Units) |  |  | Computer Science 4755 – Network Applications (3 Units) |
|  |  | Computer Science 3020 – Algorithms and Data Structures (4 Units) |  |  | Computer Science 4760 – Computer Networks (3 Units) |
|  |  | Computer Science 3015 – Functional Programming (3 Units) |  |  | Computer Science 4765 – Computer Security (3 Units) |
|  |  | Computer Science 3050 – Ethics for the Computer Professional (1 Unit) |  |  | Computer Science 5000 – Seminar in Computer Science (3 Units) |

**Lessons Learned:**

NWCCD has a number of information technology related courses available, but the University of Wyoming only accepts a limited number of courses for transfer into the Computer Science degree track. Additional research is needed to develop course concentrations for different aspects of the computer field and model additional “No Options” transfer pathways.

The development of “No Options” or limited options pathways as part of an advising strategy is a time-consuming process. In many cases, students have indicated that they were unaware of the specific requirements for completing an Associate level degree program and qualifying for transfer, or have indicated that the selection of courses available to satisfy a requirement is nearly overwhelming. By working with subject matter experts (faculty), advising departments can develop degree completion and transfer pathways that may reduce or eliminate student enrollment in courses that either do not directly benefit the program of study or may not be applicable for transfer to a four-year program of study.

As many community colleges around the country act as feeder schools to a state university system, working with the transfer advisors to develop a pathway through the baccalaureate program is an ideal way to increase the likelihood of students transferring and completing higher degrees.

While each university system has different requirements for transfer and completion, one common theme students have reported is that general education requirements in addition to baccalaureate program requirements are often not clearly identified during the advising process; students may assume that, by completing all their general education requirements at the community college level, they only have to focus on their baccalaureate program requirements – and then are surprised when they have to take additional courses.

Having advising staff at the community college level work with both discipline faculty and transfer advisors to create an articulated pathway to transfer can, therefore, reduce student confusion and stress while ensuring that all prerequisite, completion, and transfer requirements have been identified in a clear, easy to follow format.