**Continuous Improvement Plan Report to be Completed in Years 2/4 of Program Review Cycle**

**Date: 11/15/2024 Name of Program: Cloud Computing**

**Contact Name: Aparna Godbole** **Contact Email: agodbole@collin.edu Contact Phone: 972-378-1829**

**Table 1: CIP Student/Program Level Learning Outcomes Targeted for Improvement, Description of Assessment Measure(s) and Targets Levels of Success Table (focus on at least one student/program level outcome for the next two years)**

**Description of Fields in CIP Table 1:**

**A. Student Learning Outcome(s)** -Results expected in this program (e.g., students will be able to compare/contrast conflict and structural functional theories). Outcomes must be quantifiable and measurable.

**B. Assessment Measure(s)** –Assessmentinstrument(s)/process(es) used to measure results (e.g., embedded test questions 6 & 7 from final exam)

**C. Targeted Level(s) of Success** -Level of success expected (e.g., X% of students will score at least Y on the indicated assessment)

|  |  |  |
| --- | --- | --- |
| 1. **Student/Program Level Learning Outcome(s)**   **Targeted for Improvement**  (e.g., “Students will be able to…”) | **B. Description of Assessment Measure(s)**  (Assessment instrument(s)/process(es) used to measure results - Include course in which assessment will be given) | **C. Targeted Level(s) of Success**  (e.g., X% of students will score at least Y on the indicated assessment.) |
| Demonstrate understanding of cloud terminology, characteristics, cloud infrastructure and architecture | **Course midterm (ITNW 1309 Fundamentals of Cloud Computing)**  A subset of questions from the midterm (30 questions) will measure student understanding of vendor-agnostic concepts and align to the outcome. | 70% of the students are expected to achieve a 70% grade or higher on the subset of questions from the midterm in ITNW 1309. |
| Configure and implement virtual machines on a hypervisor platform | **Course lab assignment (ITNW 2375 VMware vSphere: Installation, Configuration, and Management)**  Students will be expected to demonstrate they have the knowledge to configure and deploy virtual machines. This will be measured using Lab # 4 assignment given in the course. A faculty-developed rubric will be used to determine the level of student success in the lab assignment. | 70% of the students are expected to achieve 70% grade or higher on the **specified lab assignment** in ITNW 2375. |
| Configure and implement cloud storage and database | **Course project (ITNW 1373 Cloud Storage and Database)**  Students will analyze a "client's" given business requirements to design and document the best strategy to create cloud storage and database components using a leading cloud platform. They will deploy the components, create and upload data to these components, and configure setting for encryption, replication, scalability/availability.  A faculty-developed rubric will be used to determine the level of student success in the project. | 70% of the students are expected to achieve 70% grade or higher on the **course project** in ITNW 1373. |
| Design a cloud infrastructure to solve an assigned business/technical problem using a leading cloud vendor platform | **Course project (ITNW 1336 Cloud Deployment and Infrastructure Management)**  Students in ITNW1336 are presented with a problem to solve as an assignment in this course. Students will analyze the given business/technical requirements to determine and document specifics of the Amazon Web Services (AWS) cloud services they will use. They will architect an infrastructure in AWS using best practices to develop a cloud solution. A faculty-developed rubric will be used to determine the level of student success in the project. | 70% of the students are expected to achieve 70% grade or higher on the **course project** in ITNW 1336. |
| Apply security configuration to a cloud environment using best practices | **Course project (ITNW 1374 Cloud Computing Security)**  As organizations move to the cloud, students will need to understand concepts of cloud security. Students must be able to identify best practices supporting Identity and Access Management (IAM). Students will analyze a "client's" given business and security requirements to determine, document, and apply the best strategy to create IAM profiles and permissions for the cloud environment. A faculty-developed rubric will be used to determine the level of student success in the project. | 70% of the students are expected to achieve 70% grade or higher on the **course project** in ITNW 1374. |

**Add additional rows if necessary.**

**Table 2. CIP Student Learning Outcomes 1–3 (focus on at least one for the next two years)**

**Description of Fields in CIP Table 2:**

**A. Student/Program Level Learning Outcome(s) Targeted for Improvement** -Results expected in this program (e.g., Students will be able to compare/contrast conflict and structural functional theories). Outcomes must be quantifiable and measurable.

**B. Assessment Measure(s)** – **Assessment** Instrument(s)/process(es) used to measure results (e.g., embedded test questions 6 & 7 from final exam)

**C. Targeted Level(s) of Success** -Level of success expected (e.g., X% of students will earn a score of Y or greater on the embedded test questions)

**D. Description of Action Plan to Improve Learning** -Describe action(s) to be taken to improve student attainment of the indicated student/program level outcome. What will you do?

**E. Summary of Results/Data** - Summarize the information and data collected in year 1/3 when action plan was implemented.

**F. Findings** - Explain how the information and data has impacted the expected student learning outcome.

**G. Implementation of Findings** – Describe how you have used or will use your findings and analysis of the data to make improvements.

**Student/Program Level Learning Outcome Targeted for Improvement #1**

|  |  |
| --- | --- |
| 1. **Student/Program Level Learning Outcome Targeted for Improvement #1:**   Demonstrate understanding of cloud terminology, characteristics, cloud infrastructure and architecture | |
| 1. **Assessment Measure(s):**   **Course midterm (ITNW 1309 Fundamentals of Cloud Computing)**  A subset of questions from the midterm (30 questions) will measure student understanding of vendor-agnostic concepts defined in the outcome. | 1. **Targeted Level(s) of Success:**   70% of the students are expected to achieve a 70% grade or higher on the **subset of questions** from themidterm in ITNW 1309. |
| 1. **Description of Action Plan to Improve Learning:**   The department plans to improve learning by improving the practice activities and making them mandatory for students. Each attempt will provide students with feedback pointing to their weak areas/topics which they can revisit to improve their learning. Multiple attempts will provide them with the opportunity to reach a minimum level of competency the department expects their students to achieve. Changing the format of the practice quiz questions will push students to think critically rather than simply recalling facts. | |
| 1. **Summary of Results/Data:**   A total of thirteen (13) sections of ITNW 1309 were taught from Fall 2023 up to and including Fall 2024. The department used a specific outcome focused on cloud terminology, essential characteristics, and models in Cloud Computing. A subset of the midterm (first 10 questions) in ITNW 1309 was used as a measure. Based on the data collected, **67.7% of students (195 out of 288)** earned a grade of 70% or higher on the subset of the midterm. | |
| 1. **Findings:**   The expected target of 70% was not met. | |
| 1. **Implementation of Findings:**   Cloud Computing is a paradigm shift from the traditional approach of businesses/companies using on-premise data centers. The National Institute of Standards and Technology (NIST) special publication SP 800-145, defines Cloud Computing, and covers essential characteristics of Cloud along with Deployment and Service Models, and relevant terminology. It is imperative for students to demonstrate a solid understanding of these fundamental and vendor-agnostic Cloud concepts, introduced for the first time in the ITNW 1309 course.  One of the possible reasons for not being able to meet the target for this outcome is because students tend to rely on “rote learning” instead of focusing on understanding the concepts. Chapter 1 exam in the course currently serves as a low-stakes exam on these concepts before students take the midterm. If the midterm includes a question that is modified version of the one from the Chapter 1 exam to include different answer choices or is rephrased (worded different), many students are unable to interpret the question and answer it correctly (this inference can be drawn from observations). The solution to this is to provide them with ample practice questions (different variations, questions worded in different ways, etc.). Additionally, the practice quiz must use a format that trains students to apply critical reasoning.    At the beginning of the Fall 2023 semester, the department developed and introduced a set of practice activities related to this outcome. Students were strongly encouraged by instructors to complete the practice exercises to reinforce concepts. These were, however, not mandated. The data collected from Fall 2023 up to and including Fall 2024 does indicate some improvement in performance compared to earlier data, but our target level was not met. It is important to note that ITNW 1309 serves as one of the foundational courses for students entering the Cloud Computing AAS program, but it also serves as an elective option for non-Cloud students. It is possible that not all students took advantage of the practice activities to improve their learning.  Going forward, the department will make the practice activities mandatory for students. Students will be allowed multiple attempts on the practice activities and will be required to attain a certain level of proficiency (for example, 90%) before progressing further in the course (access to the relevant chapter exam and subsequent modules will be locked until the proficiency requirement is met). The department also aims at improving the practice quiz to encourage students to analyze the given information and draw rational conclusions. Through instruction, and revised and mandated practice activities, faculty will work to ensure that the specified level of performance is achieved. | |

**Program Assessment Data Report**

**Program: Cloud Computing Terms Data Collected: Up to 7**

|  |  |  |  |
| --- | --- | --- | --- |
| Program-Level Learning Outcome- (From Assessment Plan) | Assessment Measure(s) and Where Implemented in Curriculum – (From Assessment Plan) | Target Outcome(s)- Level of Success Expected – (From Assessment Plan) | Assessment Results – (Provide data in a form related to targeted levels of success to left. Indicate if targeted level of success was met, partially met, or not met.) |
| PLO # 1 Demonstrate understanding of cloud terminology, characteristics, cloud infrastructure and architecture | A subset of questions from the midterm (first 30 questions) in ITNW 1309 Fundamentals of Cloud Computing. | 70% of the students are expected to achieve a 70% grade or higher on the subset of questions from the midterm in ITNW 1309. | 63.56% of students (342 out of 538) students earned a grade of 70% or higher on the subset of questions from the midterm in ITNW 1309 (from Fall 2021 up to and including Fall 2024).  Not met target |
| PLO # 2 Configure and implement virtual machines on a hypervisor platform | Lab 4 from ITNW 2375 VMware vSphere: Installation, Configuration, and Management | 70% of the students are expected to achieve 70% grade or higher on the specified lab assignment in ITNW 2375. | 86.82% of the students (112 out of 129) earned a grade of 70% or higher on Lab 4 in ITNW 2375 (from Spring 2022 up to and including Fall 2024).  Met target |
| PLO # 3 Configure and implement cloud storage and database | Course project in ITNW 1373 Cloud Storage and Database | 70% of the students are expected to achieve 70% grade or higher on the course project in ITNW 1373. | 76.47% of the students (52 out of 68) earned a grade of 70% or higher on the course project in ITNW 1373 (from Spring 2022 up to and including Fall 2024)  Met target |
| PLO # 4 Design a cloud infrastructure to solve an assigned business/technical problem using a leading cloud vendor platform | Course project in ITNW 1336 Cloud Deployment and Infrastructure Management | 70% of the students are expected to achieve 70% grade or higher on the course project in ITNW 1336. | 89.28% of the students (25 out of 28) earned a grade of 70% or higher on the course project in ITNW 1336 (from Spring 2023 up to and including Fall 2024)  Met target |
| PLO # 5 Apply security configuration to a cloud environment using best practices | Course project in ITNW 1374 Cloud Computing Security | 70% of the students are expected to achieve 70% grade or higher on the course project in ITNW 1374. | 81.57% of the students (31 out of 38) earned a grade of 70% or higher on the course project in ITNW 1374 (from Spring 2023 up to and including Fall 2024)  Met target |