CPI_STUDENT ACHIEVEMENT /SUCCESS

This CPI plan is created for improving student success/achievement for AY 2022-2023

Name of the department ____MS Computer Science, MS Electrical & Computer Engineering, MS Cybersecurity_______

Expected Date of Submission 8/07/2023

Contact: _Steven Billis__________

To ensure NYIT's CPI process meeting *MSCHE Standard V in Educational Effectiveness Assessment: Assessment of student learning and achievement demonstrates that the institution's students have accomplished educational goals consistent with their program of* study, *degree level, the institution's mission, and appropriate expectations for institutions of higher education*. in this CPI report, each department is requested to create a three-year assessment/evaluation plan to improve student success. Reports should address the following points:

I. State/create the educational goals of your department in regard to student success.
II. The stated goals should align with institutional mission, and NYIT strategic action plan goals to optimize student success.
III. Specify your division/department strategic action/initiatives plans with brief rationales, which include current and historical student data analysis of your department that identify the obstacles and discover areas of opportunity for improving student success.

1. *What are the student success goals and strategic actions for your department?*
2. *What are the KPI (both qualitative and quantitative measures) used to assess the actions' effectiveness?*
3. *Describe how the department set up the baseline (if possible) and expected outcomes, the methods to evaluate progress, adjust its actions and determine its effectiveness?*
4. *Identify personnel/leadership, resources to implement the plan, collect and analyze the data and create recommendations for coming years*

IV. How will the plan and results be conveyed to your department?

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Example 1:

I. Student Achievement Goal 1: students successfully gradate and employed in engineering or their chosen career path (PEO)

II. NYIT Mission alignment: Provide career-oriented professional education

III. Strategic Action Plan: Provide experiential learning in courses, provide internships for students through the Office of Career *Services.*

Strategic Actions:

a. *Expand the number, and quality of students experiential learning and internship*

b. *Improve graduation rate by* ***implementing active learning in the program's courses together with e-tools***

Student Achievement Goal 1: students successfully gradate and employed in engineering or their chosen career path (PEO)					
Actions	*KPIs*	*Expected outcomes, by AY 2024-2025*	*Do: Resources & responsible parties*	*Study: Timeline: Data collecting & analysis*	*Recommendations for Action*

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Expand the number, and quality of students experiential learning	• *Number of students participation* • *Number of students employed through internship* • *Quality evaluation of experiential learning*	*>60% (based on historical and current data)*	• *Christopher Springston Director Graduate Programs CoECS* • *Steven Billis Associate Dean Assessment*	*Annual, by assessment coordinator S.Billis*	*TBD*
Improve graduation rate by implementing active learning in the program	• *Course grade distribution in p* • *CFW rate in the courses* • *Student & faculty feedbacks*	• *Grade improvement* • *CFW rate < 10% (established by historical and external benchmarks)*	• *Instructor of CS courses: Drs. Wenjia Li, Houwei Cao, Frank Lee, Kiran Balagani, Tao Zhang, H. Gu, J.*	*Annual, by Associate Dean Assessment, S Billis*	*TBD*

			Weng, P. Gasti, ECE courses: Drs. M Colef, Z. Dong, R. Amineh, N. Artan, M Ravan, S Wadoo • *Assessment coordinator S Billis*		

The collaborative teaching strategy together with zyBook 's interactive online textbook is one example of an active learning environment that means to improve teaching and learning in the classroom. Active learning puts the responsibility of learning on the students as well as the instructor. Students are no longer just listeners but active participants in and out of the classroom. It is meant to engage students into the process of learning in order to provide a more meaningful learning experience. There is a Chinese proverb that concisely describes the collaborative teaching strategy, and active learning in general: "Tell me and I forget, teach me and I remember, **involve me and I learn**." **This approach will be applied to all the courses in the 3 graduate programs.**

Experiential learning opportunities exist in a variety of course and non-course-based forms and may include community service, service-learning, graduate research, and experiences such as internships and capstone projects, to name a few. While not every course may provide an opportunity for an open-ended project, instructors in these 3 graduate programs are encouraged to deliver courses so that **the process of learning is grounded in experience.**

The FT faculty members of the CS/INCS/ECE departments have met previously, as a group, to determine the relationship between the PLOs and the program's required and elective courses. The PLOs are then assessed using a Faculty Course Assessment Report (FCAR).

All 3 graduate programs offer the option of 6 credits of thesis, or 6 credits of electives approved by their chairperson. Currently only the MS/CS program offers the option of a 3-credit project course. The PLOs that lend themselves to assessment based on experiential learning are:

MS/CS: PLO 5: a comprehensive knowledge of analysis, design, and development of a computerized system

This PLO is linked to:

CSCI 606 Distributed Systems:
This course introduces the principles and practice underlying the design of distributed systems, both Internet-based and otherwise. Major topics include interprocess communication and remote invocation, distributed naming, distributed file systems, data replication, distributed transaction mechanisms, and distributed shared objects, secure communication, authentication and access control, mobile code, transactions, and persistent storage mechanisms. **A course project is required to construct working distributed applications using contemporary languages, tools, and environments.**

CSCI 621 Programming Languages:
The general principles of modern programming language design: Imperative (as exemplified by Pascal, C and Ada), functional (Lisp), and logical (Prolog) languages. Data management, abstract data types, packages, and object-oriented languages (Ada, C + +). Control structures. Syntax and formal semantics. While some implementation techniques are mentioned, the primary thrust of the course is concerned with the abstract semantics of programming languages.

CSCI 690 Computer Networks:
Connection of multiple systems in a networked environment. Topics include physical connection alternatives, error management at the physical level, commercially available protocol support, packet switching, LANs, WANs, and Gateways.

CSCI 651 Algorithmic Concepts:
Abstract Data Structures are reviewed. The course covers the study of both the design and analysis of algorithms. Design methods include: divide-and-conquer;

the greedy method; dynamic programming; basic traversal and search techniques algebraic and geometric problems as well as parallel algorithms (PRAM). Space and time complexity; performance evaluation; and NP-Hard and NP-Complete classes are also covered. **The purpose of this approach to the subject is to enable students to design and analyze new algorithms for themselves.**

CSCI 870 Project I

In either the fall or spring semester, each CS faculty member prepares an FCAR for each course they teach. The FCAR requires:
• The FT or adjunct faculty teaching a specific course is required to establish appropriate performance tasks (APTs) to assess to what extent each PLO is being met. These APTs may be quizzes, exam questions, reports, projects, presentations, etc.
• Each student's APT is then used to create an EGMU vector for each PLO and a corresponding assessment metric. It should be noted that the faculty member is required to show which part of each APT is being used to form a metric for the student outcome with appropriate documentation. The EGMU rubrics are:

EGMU Rubrics

EGMU		Score
E - Excellent	● Fully demonstrates/accomplishes the at behavior in the rubric	3
G – Good	● Mostly demonstrates/accomplishes the and behavior in the rubric	2
M – Minimal	● Minimally demonstrates/accomplishes attributes and behavior in the rubric	1
U - Unsatisfactory	● Does not demonstrate/accomplish the a and behavior in the rubric	0

Using CSCI 606 and CSCI 651 which have design elements for experiential learning PLO 5 was scored as 1.85 and 2.25 respectively. This provides some indication that the CFW rate was < 10%.

MS/INCS: PLO 3: Design, implement and maintain software tools to support network security and integrate these tools within multiple operating systems and platforms.

This PLO is linked to:

CSCI 620 Operating System Security:
In this course students are introduced to advanced concepts in operating systems with emphasis on security. Students will study contemporary operating systems including UNIX and Windows. Topics include the application of policies for security administration, directory services, file system security, audit and logging, cryptographic enabled applications, cryptographic programming interfaces, and operating system integrity verification techniques.

INCS 870 Project I

Using the FCAR assessment as described previously, with INCS 870 the EGMU score was 2.35 which indicates that the CFW rate was < 10%

MS/ECE PLO 4: a comprehensive knowledge of advances in areas such parallel computing, networks and VLSI design.

This PLO is linked to:

EENG 633 Parallel Computing:
The course introduces students to parallel computer systems. The course covers topics such as sequential and parallel execution, synchronization, pipelines, and vector processing. SIMD and MIMD machines are studied. Multistage and computer interconnection networks are presented. The routing and the flow control in these networks are discussed. Shared memory, multicomputer systems, caches, and cache coherence are covered. Data flow systems are introduced and analyzed.

EENG 741 Computer Architecture II:
Discussions of the advancements in computer architecture of and beyond the Von Neumann Architecture. This will include pipelined machines. RISC machines, parallel architectures, distributed architectures, and language directed architectures. Equivalent to CSCI 741.

EENG 755 Computer Networks:
Quantitative approaches to the design of data and computer networks including the telephone network. Applications of queuing theory blocking and delay. Packet switching and OSI standards. Concepts of a layered architecture. The data link layer. Flow and congestion control in a network, routing, higher layers. An introduction to local area networks. **A design project is part of this course.**

Using the FCAR assessment as described previously, with EENG 755 the EGMU score was 2.15 which indicates that the CFW rate was < 10%

It is recommended that MS/INCS and MS/ECE implement the option of a 3-credit project course.

Graduate Director Chris Springston oversees student internships. He provides the information to the respective chairpersons who then require that weekly reports that document student employment be submitted together with feedback from their supervisor as to the quality of their work performance.

Micro-Internships: Micro-Internships are short-term, paid, professional assignments that are like those given to new hires or interns. These projects enable Career Launchers to demonstrate skills, explore career paths, and build their networks as they seek the right full-time role. Unlike traditional internships, Micro-Internships can take place year-round, typically range from 5 to 40 hours of work, and are due between one week and one month after kick-off. Micro-Internships are used by companies ranging from those in the Fortune 100 to emerging start-ups, and go across departments including sales, marketing, technology, HR, and finance.

Examples of Experiential Learning Design Projects

Project Proposal: Facial Recognition Attendance System (CS)

In this project, students will be exploring the potential for utilizing facial recognition technology in the design and implementation of an attendance system. The proposed system will be able to capture images of individuals' faces as they enter or exit a specific area and will utilize advanced algorithms to extract and analyze facial features to accurately identify and track individuals. This system has the potential to greatly streamline and improve traditional attendance tracking methods, providing more efficient and accurate attendance tracking for a variety of applications.

Project Proposal: Malware Detection for Android System Using Meta-Features (INCS)

In March of 2012 the Google Play Store was launched, and users were allowed to publish Android applications to the store with no special account or registration needed. This made it possible for users to develop and distribute applications with malicious intents such as tracking one's location, accessing one's camera, or sending messages without the victim's knowledge. To solve this problem, students developed a Support Vector Machine (SVM) based malware detection approach, which uses different combinations of API calls and permissions as features to train a classifier that can tell if an app is malicious or not.

Project Proposal: Motion Sensor Controlled Robotic Arm (ECE)

In this project, students are required to design and implement a robotic arm that can be controlled via a glove that is worn by the user. The students need to use their knowledge in electrical circuits, electronics, programming, signal processing, machine learning and microcontrollers. The constraints/challenges that the students need to consider in their designs include: (1) designing a glove that is wearable by the user, and a robotic arm using a 3D printer, (2) embedding electronics in the glove including battery to make sure that it is light for the user, and (3) translate the hand and finger movements of the user to the robot's motions. The students also need to consider multiple IEEE standards for communication.

The results of this CPI Report involved al the ECE/CS/INCS FT faculty and the results will be shared with the adjunct faculty as well. In addition, these results will lead to further improvements with respect to graduation rates for next year's CPI Report.