# **Information Assurance and Cybersecurity MS**

# **Technical Competence - To Develop And Demonstrate Knowledge Of Theoretical** Materials, And Computational And Technical Skills

### **Goal Description:**

Graduates with a master degree in information assurance and security will have a strong technical foundation, that is, to develop and demonstrate knowledge of theoretical materials, and computational and technical skills in the areas of information assurance and information security.

**Providing Department:** Information Assurance and Cybersecurity MS

#### **Progress:** Completed

**RELATED ITEMS/ELEMENTS** 

#### **RELATED ITEM LEVEL 1**

## **Understand The Body Of Knowledge Of Information Assurance And Security** Learning Objective Description:

Students will develop and demonstrate knowledge of theoretical materials, technical skills and project management relevant to information assurance and information security.

#### **RELATED ITEM LEVEL 2**

Written Comprehensive Examination **Indicator Description: MS in IAC's Comprehensive Exam** 

Our MS in IAC offers three options of Degree Plan:

- Plan 1 Thesis Option requires 24 hours of a coursework which is a combination of compulsory (core) and track elective courses, and 6 hours of thesis courses (COSC/DFSC 6348 and 6049). In total, the program requires 30 hours. Thesis students must register for COSC/DFSC 6347 in their proposal semester, and for COSC/DFSC 6049 in their defense semester. Note that continuous enrollment in the thesis course is required upon initiation of the thesis until completion.
- Plan 2 Non-Thesis Option requires 27 hours of a coursework which is a combination of compulsory (core) and track elective courses, and 3 hours of a master project course (COSC/DFSC 6347). In total, the program requires 30 hours. Non-thesis students are required to complete written comprehensive exams in core subjects where they received a grade of B or lower. Non-thesis students must register for COSC/DFSC 6347 in their terminal-semester. Note that continuous enrollment in the COSC 6347 course is required upon initiation of COSC 6347 until completion.
- Plan 3 Professional Option requires 30 hours of a coursework which is a combination of compulsory (core) and track elective courses.

All MS in IAC students in Non-Thesis and Professional Options must pass written comprehensive exams for core subjects where they obtained a grade of B or lower, achieving a grade of at least 70. As exams are conducted during their terminal semester, it is strongly encouraged to finish the core subjects before the terminal semester.

- The core courses for IAC program (Non-Thesis) are:
  - COSC 5325 Operating System Security
  - COSC 5335 Database Security
  - DFSC 5310 Principle and Policy in Information Assurance
  - DFSC 5315 Network and Cyber Security

- DFSC 5336 Business Continuity Management
- The core courses for IAC program (Professional) are:
  - COSC 5325 Operating System Security
  - COSC 5335 Database Security
  - DFSC 5310 Principle and Policy in Information Assurance
  - DFSC 5315 Network and Cyber Security
  - DFSC 5336 Business Continuity Management
  - DFSC 5338 Ethical Hacking
  - COSC 5330 Malware

#### **Indicators**

The indicators for the MS in IAC Program's comprehensive exam are outlined as follows:

- COSC 5325 Operating System Security
  - Students' understanding of security concepts and techniques for operating systems is assessed using direct measures, including exam scores and project evaluations. The comprehensive exam includes questions on the rationale for security, methodologies for designing operating system security, and forensic techniques applicable to various operating systems. The comprehensive exam scores are collected to assess student performance on these key topic.
- COSC 5335 Database Security
  - Students' understanding of database security concepts and techniques is assessed using direct measures, including exam scores and project evaluations. The comprehensive exam includes questions on topics such as database authentication, account security, encryption of data in transit and at rest, database auditing, and virtual private databases. The comprehensive exam scores are collected to assess student performance on these key topic.
- DFSC 5310 Principle and Policy in Information Assurance
  - Students' understanding of security planning, policy formation, and risk management is assessed using direct measures, including exam scores and project evaluations. The comprehensive exam includes questions on security education, training and awareness programs, and physical and electronic approaches to data protection. The comprehensive exam scores are collected to assess student performance on these key topic.
- DFSC 5315 Network and Cyber Security
  - Students' understanding of network and cyber security principles is assessed using direct measures, including exam scores and project evaluations. The comprehensive exam includes questions on methodologies for designing security systems, establishing security protocols, and identifying best practices in administration, testing, and response protocols for secure communications. The comprehensive exam scores are collected to assess student performance on these key topics.
- DFSC 5336 Business Continuity Management
  - Students' understanding of threat identification, risk assessment, vulnerability analysis, and business continuity for enterprise IT systems is assessed using direct measures, including exam scores and project evaluations. The comprehensive exam includes questions on physical safeguards, policies for data protection at fixed sites, and techniques for maintaining enterprise data during critical circumstances. The comprehensive exam scores are collected to assess student performance on these key topics.
- DFSC 5338 Ethical Hacking
  - Students' understanding of penetration testing and vulnerability analysis is assessed using direct measures, including exam scores and project evaluations. The comprehensive exam

includes questions on methodologies, techniques, and tools used to identify and exploit vulnerabilities in information technology systems. The comprehensive exam scores are collected to assess student performance on these key topics.

- COSC 5330 Malware
  - Students' understanding of malicious software identification and deconstruction is assessed using direct measures, including exam scores and project evaluations. The comprehensive exam includes questions on static and dynamic analyses of malware, malware deconstruction techniques, and rootkit elimination. The comprehensive exam scores are collected to assess student performance on these key topics.

#### **Criterion Description:**

#### MS in IAC's Comprehensive Exam Criteria

The criterion for each course's comprehensive exam is to achieve a passing score of at least 70%. If a student fails the exam, they are allowed one re-examination. A third attempt may be permitted only with the approval of the appropriate academic dean and the department. Students who fail all three attempts are terminated from the program. This policy ensures that students have multiple opportunities to demonstrate their understanding of the material while maintaining academic standards.

## Findings Description: <u>MS in IAC, Comprehensive Exam Results</u>

#### Fall 2023

There were 5 students required to take the test for the following courses.

- COSC 5325 Operating System Security
  - 2 students received an A and thus were granted a waiver.
  - All 3 remaining students scored at least 80% on the test.
- COSC 5335 Database Security
  - 3 students received an A and thus were granted a waiver.
  - All 2 remaining students scored at least 80% on the test.
- DFSC 5310 Principle and Policy in Information Assurance
  - 4 students received an A and thus were granted a waiver.
  - $\circ~1$  remaining student scored at least 80% on the test.
- DFSC 5315 Network and Cyber Security
  - 4 students received an A and thus were granted a waiver.
  - 1 remaining student scored at least 80% on the test.
- DFSC 5336 Business Continuity Management
  - 4 students received an A and thus were granted a waiver.
  - 1 remaining student scored at least 80% on the test.

Overall, all students who were required to take the comprehensive exam successfully passed, with each scoring at least 80%. This indicates that the program's preparation and support mechanisms were effective for the students who took the exam.

#### Spring 2024

We had one student in their terminal semester who received an A for all core courses, and thus was granted a waiver.

#### **Summer 2024**

We had two students in their terminal semester who received an A for all core courses, and thus were granted a waiver.

#### **Findings**

- High Passing Rates: All students required to take the comprehensive exam scored at least 80%, demonstrating strong overall performance.
- Effective Preparation: The consistent high performance on the comprehensive exams suggests that the program's preparation and support mechanisms are effective.
- Waivers Due to High Grades: The waiver system appears to be functioning as intended, with a significant number of students receiving waivers due to achieving an A in their core courses. This indicates that students who excel in their coursework are adequately prepared for the comprehensive exam.

#### **RELATED ITEM LEVEL 3**

## Written Comprehensive Examination **Action Description:**

#### **Action Plan for MS in IAC's comprehensive exams:**

- Maintain the current support and preparation strategies that have led to high passing rates. Regularly review and update the exam preparation resources and support services based on student feedback and performance data.
- While the waiver system is successful in reducing the number of students required to take the exam, evaluate if any adjustments are needed to better align with program objectives or address any emerging trends.
- Regularly review the comprehensive exam content to ensure it aligns with the current curriculum and adequately assesses the students' knowledge and skills. Update exam content if necessary to reflect any changes in the program or industry standards.
- Ensure that students are well-informed about the comprehensive exam requirements and waiver criteria. This will help maintain high levels of performance and minimize any confusion regarding the examination process.

#### **RELATED ITEM LEVEL 1**

#### **Apply Knowledge And Skills In Projects And Real Work Environments Performance Objective Description:**

Students will practice and demonstrate their capabilities and skills relevant to information assurance and security in projects simulating real world tasks.

**RELATED ITEM LEVEL 2** 

**Final Capstone Project KPI Description: MS in IAC's Capstone Projects** 

Our MS in IAC offers three options of Degree Plan:

- Plan 1 Thesis Option requires 24 hours of a coursework which is a combination of compulsory (core) and track elective courses, and 6 hours of thesis courses (COSC/DFSC 6348 and 6049). In total, the program requires 30 hours. Thesis students must register for COSC/DFSC 6347 in their proposal semester, and for COSC/DFSC 6049 in their defense semester. Note that continuous enrollment in the thesis course is required upon initiation of the thesis until completion.
- Plan 2 Non-Thesis Option requires 27 hours of a coursework which is a combination of compulsory (core) and track elective courses, and 3 hours of a master project course (COSC/DFSC 6347). In total, the program requires 30 hours. Non-thesis students are required to complete written comprehensive exams in core subjects where they received a grade of B or lower. Non-thesis students must register for COSC/DFSC 6347 in their terminal-semester. Note that continuous enrollment in the COSC 6347 course is required upon initiation of COSC 6347 until completion.
- Plan 3 Professional Option requires 30 hours of a coursework which is a combination of compulsory (core) and track elective courses.

All MS in IAC students in Thesis Option are required to complete a Thesis, while students in Non-Thesis Option must complete a master's project.

- A thesis is typically a more extensive and in-depth research project. It involves conducting original research, often contributing new knowledge or insights to the field. Theses require a rigorous investigation, data collection, analysis, and interpretation of results. They are expected to be comprehensive and demonstrate a deep understanding of the chosen topic. The primary purpose of a thesis is to contribute new knowledge or advance the existing body of knowledge in the chosen field.
- On the other hand, a master's project is generally a smaller-scale endeavor compared to a thesis. It might involve applying existing knowledge to solve a practical problem or developing a prototype, application, or creative work. While it still requires research and analysis, the scope is usually narrower and more focused. Master's projects tend to emphasize practical application.

#### **KPIs**

#### Thesis

- Completion Rate: The percentage of students in the Thesis Option who successfully complete and defend their thesis by the end of their program.
- Grade Achievement: The percentage of students who receive an "A" or equivalent grade for their thesis.
- Publication and Contribution: The number of theses that result in a publication, presentation, or significant contribution to the field.
- Time to Completion: The average time taken for students in the Thesis Option to complete their thesis from the start of the project.

#### **Master's Project**

- Completion Rate: The percentage of students in the Non-Thesis Option who successfully complete and present their master's project.
- Grade Achievement: The percentage of students who receive an "A" or equivalent grade for their master's project.
- Timeliness: The average time taken for students in the Non-Thesis Option to complete their master's project from initiation to final submission.

## **Target Description:**

The following targets are associated with each Key Performance Indicator (KPI) for the MS in IAC program:

## Thesis

- Completion Rate: Aim for 90% or higher of students in the Thesis Option to successfully complete and defend their thesis by the end of their program.
- Grade Achievement: Target 80% or higher of theses to receive an "A" grade or its equivalent.
- Publication and Contribution: Aim for 25% of theses to result in a publication, presentation, or significant contribution to the field.
- Time to Completion: Average time for thesis completion should be within 2 semesters from the start of the thesis project.

## **Master's Project**

- Completion Rate: Aim for 90% or higher of students in the Non-Thesis Option to successfully complete and present their master's project.
- Grade Achievement: Target 80% or higher of master's projects to receive an "A" grade or its equivalent.
- Timeliness: Average time for project completion should be within two semesters from the start of the project.

## **Results Description:**

#### **Results**

## Fall 2023

• Non-Thesis Option: Two students successfully completed their projects within two semesters, receiving grades of "A" and "B," respectively. One student completed their project within two semesters but received a "C." Additionally, two students required more time to finish their projects and thus delayed their completion.

## Spring 2024

• Non-Thesis Option: One student was terminated due to non-attendance throughout the semester and was unable to complete their project. Another student from Fall 2023 paused their project and did not complete it. One student successfully completed their project within two semesters, receiving an "A.".

## Summer 2024

• Non-Thesis Option: Two students completed their projects within two semesters, receiving

#### grades of "A" and "B," respectively.

#### **Findings**

#### **Thesis Completion**

Since the Thesis Option was recently launched, no students were able to complete their theses during the 2023-2024 academic year. This result highlights the need for further evaluation of the support structures and timelines provided to students opting for the thesis track.

**Master's Project Completion** 

In Fall 2023, one student in the Non-Thesis Option completed their project within two semesters and received a "B" grade, indicating that while the project was completed on time, there is room for improvement in quality. Also, two students required more time to finish their projects, leading to delays in their completion. In Spring 2024, one student was terminated due to non-attendance, and another student from Fall 2023 paused their project and did not complete it. This highlights a need for better support mechanisms to address issues leading to project delays or terminations. However, there was a positive outcome as one student completed their project with an "A" grade. In Summer 2024, two students successfully completed their projects within the two-semester timeline, receiving grades of "A" and "B," respectively. These results indicate that while the program effectively supports students who complete their projects, there are areas for improvement in addressing the needs of students who face challenges such as terminations or pauses.

#### **Program Effectiveness**

The program's effectiveness is evident from the Spring 2024 and Summer 2024 results, where students received "A" grades for their projects, indicating high-quality outcomes and successful adherence to program standards. However, the varied grades in Fall 2023 suggest that there may be inconsistencies in the support and guidance provided to students, pointing to the need for a more uniform approach to ensure consistent quality across different terms.

#### **Summer Term**

No students completed a thesis or master's project during Summer 2024, which suggests a lower number of active students during this period. This finding indicates the need to assess student engagement and project completion rates during the summer term, potentially adapting strategies to encourage continued progress and support for thesis and project completions throughout the entire academic year.

#### **RELATED ITEM LEVEL 3**

## Final Capstone Project Action Description: <u>Action Plans for MS in IAC's Casptone Projects</u>

- 1. Continue to ensure that project proposals are reviewed within the first two weeks of the semester. Consider streamlining the review process if needed, and provide timely feedback to students to help them refine their proposals.
- 2. Maintain the structure of weekly progress meetings with project advisors. Ensure that these meetings are productive by providing guidelines for effective progress reporting and addressing any issues that arise.
- 3. Review the midterm evaluation process to ensure it effectively assesses students' progress. Collect feedback from both students and faculty to identify any areas for improvement in the evaluation process.
- 4. Ensure that the distribution of project activities among committee members is balanced and that all committee members are engaged in the evaluation process. Consider providing additional training or guidelines for committee members to enhance their effectiveness.
- 5. Evaluate the effectiveness of the final project presentations and provide constructive feedback to students. Consider implementing a formal feedback mechanism for both the presentation and the completed application to help students improve their work.6. Periodically review the established procedures for managing projects to ensure they align with current best practices and address any emerging needs or challenges. Update procedures as necessary to improve the overall project management process.

7. Promote the identification of significant application development needs by encouraging students to engage with real-world clients or scenarios. Provide additional resources or support to help students address complex, real-world problems in their projects.

# **Update to Previous Cycle's Plan for Continuous Improvement Item**

## **Previous Cycle's Plan For Continuous Improvement (Do Not Modify):**

## **Closing Summary**

The GCC will conduct multiple meetings during the Fall 2023 and Spring 2024 semesters to discuss how to improve the below weaknesses identifed during DF program's review as we were of the view that the recommendations applying equally to the IAC program.:

- 1. Low student enrollment
- 2. Low student degree conferred
- 3. No Thesis option

## Update of Progress to the Previous Cycle's PCI:

The registration status for the previous academic year (MS in IAC), based on data from the SHSU Enrollment Fact page, is as follows:

- 2022-2023
  - Fall 2022: 29
  - Spring 2023: 24
  - Summer 2023: 11
- 2023-2024
  - Fall 2023: 23
  - Spring 2024: 23

## Actions taken during 2023-2024

- Recruitment Scholarships: To address low student enrollment, we have introduced recruitment scholarships with support from the Dean's office. This initiative offers \$1,000 to students who register early, with the first 30 students receiving this benefit. As of May 12, 24 students have registered and been notified of the awards, including 12 from the Computer Science program.
- Advertising to New Students: To enhance student recruitment, we conducted new student orientations at least once a month. These orientations help lift advising holds promptly and highlight the scholarship program, encouraging early registration and securing benefits.
- Remedy for STEM/Preparatory Students: We identified that several STEM/Preparatory students were on the verge of leaving the program due to financial aid issues with their courses. We addressed this by working with the Registrar's office, Financial Aid office, and other departments to ensure these courses are now covered by financial aid, resulting in improved retention.
- Program Options: The addition of *Professional* and *Thesis* options for the DF program has been

approved and has been available starting Fall 2024. This addition has aimed to provide more flexibility and enhance the program's appeal.

## New Plan for Continuous Improvement Item

## **Closing Summary:**

Continue offering recruitment scholarships to attract new students. Expand the scholarship program if possible and ensure that the promotion of these scholarships is well-publicized during orientations and through other channels.

Ensure that financial aid coverage for STEM/Preparatory courses is maintained. Regularly review and adjust financial aid policies to support students effectively and retain them in the program.

Discuss implementing additional support mechanisms for students working on their theses and projects.

Continue to monitor the impact of the Professional and Thesis Options and make necessary adjustments based on student enrollment trends and feedback.