

Alabama Commission on Higher Education

PROPOSAL FOR A NEW DEGREE PROGRAM – NEW APPLICATION TOOL

Please check one: Baccalaureate Program Graduate Program

A. General Information

1. Institution: Troy University
2. Institutional Contact Person: Hal Fulmer, Ph.D.
Title: Associate Provost/ Dean, Undergraduate & First – year Studies
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3. Program Identification--
Field of Study/ Program Title: Cyber Security Major
Degree: BA/ BS
CIP Code: 11.0101
4. Date of Proposal Submission: March 9, 2018
5. Proposed Program Implementation Date: Fall, 2018
6. Program Administration:
Name of College/School: College of Arts & Sciences
Name of Dean: Steven Taylor, Ph.D.
Name of Department: Computer Science
Name of Chair: Jiling Zhong, Ph.D.

Note: Please expand all response fields as necessary.

B. Program Purpose and Description

1. In no more than one paragraph describe the purpose of the proposed program. Please also include a brief statement regarding how the program's purpose is related to the University's mission and goals.

The Bachelor of Science in Cyber Security at Troy University will provide a unique and up-to-date curriculum that will introduce students to the theoretical foundations and laboratory experiments in cyber security. This program will offer courses in Information Assurance, Cyber Security, Cryptology, Practice and Policies. As such, this curriculum will place Troy University's undergraduate major in Cyber Security as a program with a number of unique components.

2. Please provide a description of the specific kinds of employment opportunities, post-graduate professional degree programs, and other graduate programs that will be available to the graduates.

Many of the graduates of the program will seek employment in among many others, Professional Services, Finance, and Manufacturing/Defense sectors, etc. Some of the typical job titles include, Forensic Computer Analyst, Information Security Analyst, Security Architect, IT Security Engineer, Security Systems Administrator, and IT Security Consultant, to name a few.

Graduates may also continue their education at the graduate level, in the areas of Cybersecurity or Computer Science with a concentration of Networking, Network Security, etc.

3. Succinctly list at least four (4) but no more than seven (7) of the most prominent ***student learning outcomes*** of the program. These outcomes should lend themselves to subsequent review and assessment of program accomplishments.
 - 1) Students will be able to understand the attack methodology and defend such attacks with available tools and technologies.
 - 2) Students will be able to identify security issues in software. Evaluate such risks and perform risk analysis.
 - 3) Students will be able to understand basic cryptographic algorithms, identify and analyze cryptographic flaws in software application.
 - 4) Students will be able to understand and appreciate the legal and ethical aspects of cyber security and their impact on business decisions.

C. Need for the Program

1. **State need.** Briefly describe why the program is specifically needed for the State of Alabama. (State need is considered a priority in the review process.)

Currently, in the State of Alabama none of the schools are offering a Bachelor of Science in Cyber Security, with a heavy computer science foundation. The proposed program will provide a unique opportunity for the students.

On the other hand, financial institutions, educational institutions, various businesses have been progressively more interested in protecting their resources from cyber-attacks. However, IT professionals with the right specialization in developing secure software, fending various cyber intrusions are hard to find. The proposed program will help provide the needed professionals in this regard.

2. **Employment Opportunities.** Based on your research on the employment market for graduates of this program, please complete the following table reporting the total projected job openings (including both growth and replacement

demands) in your local area, the state, the SREB region, and the nation. These job openings should represent positions that require graduation from a program such as the one proposed.

Career and College Readiness/Preparation -- Projected Job Openings

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Local	97	124	159	204	261	844
State	970	1242	1590	2035	2605	8442
SREB	34520	44186	56557	72394	92664	300320
Nation	96870	123994	158711	203451	260033	842759

Please briefly describe your methodology for determining employment opportunities – projected job openings. Be sure to cite any data sources used in formulating these projections. The actual survey instrument, detailed results, and associated data file(s) must be maintained internally by the institution for five years from the implementation date. The survey upon which the proposal is based must be available for ACHE Staff examination upon request for that five year timeframe. The survey instrument, detailed results, or associated data file(s) should not be included in the proposal.)

Data Source: <https://www.bls.gov/oes/current/oes151122.htm#st>,
<https://www.bls.gov/oes/current/oes151122.htm#nat>

Under Information Security Analyst, as of June 2016, these are the job openings in the relevant states:

VA: 11550, NC: 3590, SC:1380, GA:2310, FL:4810, AL:970, TN:1240, MS:310, LA:570, TX 7790

Nationwide, this occupation has a 28% projected growth per year.

3. Student Demand - Enrollment projection. Please briefly describe your methodology for determining enrollment projections. If a survey of student interest was conducted, please briefly describe the survey instrument, number and percentage of respondents, and summary of results. (The survey instrument, and associated data file(s) need not be included in the proposal. This proposal information should be maintained for ACHE Staff review for five years from the actual implementation date.)

The following are the findings of Rasmussen Survey.

1. **Cyber security jobs are on the rise**

The U.S. Bureau of Labor Statistics (BLS) projects cyber security jobs to increase 18 percent through 2024, which is more than twice the average for all occupations.

2. **Cyber security professionals are needed in all industries**

3. **Companies are struggling to find qualified cyber security professionals**

One report predicted a global shortage of two million cyber security professionals by 2019. It also notes that 84 percent of employers believe half or fewer cyber security applicants are qualified for the position.

4. **Employers are seeking candidates with a Cyber Security degree**

The data revealed that 86 percent of job postings called for candidates with at least a Bachelor's degree.

5. **Cyber security job opportunities increase with education level**

High school diploma: 5,068 job postings

Associate's degree: 4,158 job postings

Bachelor's degree: 57,159 job postings

Master's degree: 1,449 job postings

Doctoral degree: 394 job postings

6. **Cyber security professionals can expect above-average earnings**

The BLS reports the median annual salary for cyber security analysts in 2016 was \$92,600.2 This is more than twice the national average for all occupations.

7. **The cyber security field offers room for career advancement**

0 to 2 years: 10,878 jobs available

3 to 5 years: 33,769 jobs available

6 to 8 years: 14,936 jobs available

9+ years: 10,582 jobs available

<http://www.rasmussen.edu/degrees/technology/blog/cyber-security-degree-worth-it/>

D. Specific Rationale (Strengths) for Program

What is the specific rationale (strengths) for recommending approval of this proposal? List no fewer than three (3) and no more than five (5) potential program strengths.

1. The program will provide students with in depth knowledge of practices and policies of cyber security.
2. The program will prepare selected students to successfully compete for admission to graduate programs within this field and to excel as graduate students.
3. The program will provide students entering directly into the marketplace, the necessary practical skills and training to successfully compete for career opportunities within the field of cyber security.

4. The program's facilities and on-site research opportunities will help to provide hands-on, practical experiences in the various areas of cyber security.

Please note that letters of support may be included with the proposal.

E. Similar Programs

Using the ACHE Academic Program inventory found at

<http://www.ache.state.al.us/Content/Departments/Instruction/StudentInfo.aspx>

List below all programs at the same degree level (by institution) that utilize the same 6-digit CIP code as the one being requested in the program proposal.

Also, list any programs at other CIP codes that may be offering similar instruction.

If there are no similar programs place a "0/none" by 1. in the listing directly below.

Note: Institutions should consult with ACHE Staff during the NISP phase of proposal development to determine what existing programs are considered duplicative of the proposed program.

The following institutions offer similar programs at this level:

1. University of Alabama in Huntsville, MS in Cybersecurity (111003)
2. Auburn University at Montgomery, MS in Cybersystems & Information Security (111003)
3. Alabama State University, BS Computer Information Systems (110401)
4. University of North Alabama, Bachelor of Business Administration in Computer Information Systems (521201)
5. University of West Alabama, Bachelor of Business Administration in Computer Information Systems (521201)
6. Athens State University, BS in Information Assurance (521201)
7. University of Alabama at Birmingham, MS in Computer Forensics & Security Management

Please add numeration and list additional similar programs, if applicable.

If the program duplicates, closely resembles, or is similar to another program already offered in the State, provide justification for that duplication.

Also, if a graduate program, please identify and list any similar programs at institutions in other SREB states.

There are various certificate programs in the state but currently there is no program which offers Bachelor's degree with a major specifically in Cyber Security.

F. Collaboration With Other Institutions/Agencies

Does the institution plan on collaborating with other institutions in the delivery of this program?

Yes No

If yes, please indicate below which institutions and describe the basis of this collaboration.

If no, please indicate your reasons why.

Troy University is always open to partnerships and collaboration with both 2-year and 4-year institutions. At this time, there is no active partnership in place as part of the request for approval for this program.

G. Curriculum

1. Program Completion Requirements: (Enter a credit hour value for all applicable components, write N/A if not applicable)

Credit hours required in major courses	___ 54 ___
Credit hours required in minor	___ n/a ___
Credit hours in institutional general education or core curriculum	___ 50 ___
Credit hours required in support courses	___ n/a ___
Credit hours in required or free electives	___ 16 ___
Credit hours for thesis or dissertation	___ n/a ___
Total credit hours required for completion	___ 120 ___

2. Will this program be related to other programs at your institution?

The program is related to the Computer Science Program degree and to a lesser degree, to Criminal Justice Program.

If so, which ones and how?

There is some overlap between this program and the 2 other programs. In the case of computer science, the overlap mainly is in the area of Networking, Network Security, Operating Systems and in the case of Criminal Justice, the overlap is in the area of Forensics, Cyber Law, etc.

3. Please identify any existing program, option, concentration or track that this program will replace at your institution.

None

4. Is it likely that this program will reduce enrollments in other graduate programs at your institution? If so, please explain.

No

5. If this is a graduate program, please list any existing undergraduate programs at the institution which are directly or indirectly related to the proposed graduate program. If this is a doctoral proposal, also list related master's programs at your institution.

N/A

6. Please complete the table below indicating the proposed program's courses. Include the course number, and number of credits. (If feasible/useful, please group courses by sub-headings within the table.)

Course Number and Title	Number of Credit Hours	* If New Course
CJ 4472 Cyber Crime	3	
CJ 4473 Computer Forensics	3	
CS 2255 Computer Science II	3	
CS 3323 Data Structures	3	
CS 3333 Introduction to Cryptography	3	New Course
CS 3334 Foundations of Cyber Security	3	New Course
CS 3336 Information Assurance	3	New Course
CS 3360 Concepts of Object-Oriented Programming I	3	
CS 3365 Introduction to Computer Organization and Architecture	3	
CS 4420 Introduction to Database Systems	3	
CS 4445 Data Communication and Networking	3	
CS 4448 Operating Systems	3	
CS 4452 Cyber Security Policies and Compliance	3	New Course
CS 4453 Ethical Hacking	3	New Course
CS 4454 Secure Software Development	3	New Course
CS 4455 Cyber Security Techniques and Practices	3	New Course
MTH 2215 Applied Discrete Math	3	

7. Enumerate and briefly describe any additional requirements such as preliminary qualifying examination, comprehensive examination, thesis,

dissertation, practicum or internship, some of which may carry credit hours included in the list above.

This is an undergraduate program and does not require any preliminary qualifying examinations.

8. Does the program include any options/concentration. If so, please describe the purpose and rationale and list the courses in the option.

Currently, there is no options or concentrations in the program. This is a 54-credit hour program at the undergraduate level. No minor is required.

9. State and list if the program has any special admission requirements. If none, state: "The program has no special admission requirements".

The program has no special admission requirements.

H. Program Review and Assessment

In the final analysis, the institution and its governing board are accountable for the quality, utility and productivity of this and all other programs of instruction.

With this in mind, please describe the procedures that will be used in assessing the program's outcomes.

Be sure to include:

1. An assessment process for the student learning outcomes;

A set of target courses will be selected to measure the student learning outcomes. Rubrics and a set of goals will be established. An annual evaluation will take place and remedial plans will be implemented in case when goals are not achieved.

2. A follow-up plan to determine accomplishments of graduates such as obtaining relevant employment or being admitted to a masters or doctoral program (graduate or professional).

The Chair of the Department of Computer Science along with the coordinator for the Cyber Security Program will closely work with students within the program and will record student achievements such as graduate school admissions and / or employment successes.

I. Accreditation

If there is a recognized (USDE or CHEA) or other specialized accreditation agency for this program, please identify the agency and explain why you do or not plan to seek accreditation. If there is no accrediting or similar body for this degree program state as such in your response.

ABET is proposing a specialized accreditation for this program. The program as proposed is in line with the drafted ABET recommendations. We are committed to seeking ABET accreditation when it becomes available.

J. Instructional Delivery Method

1. Describe which instructional delivery methods will be utilized in delivering this program.

The general studies courses in the program can be completed via distance learning while the upper level courses as part of the program will be taken in the classroom on the Troy University- Troy campus. In the future, there are plans to offer the upper level courses via distance learning as well.

2. If distance technology is being utilized, indicate an approximate percent of the total program's courses offered that will be provided by distance education _____50__ %

3. If distance education is not being utilized, please explain why not.

At this time, only Troy campus will offer the program, but it may be extended to online format in the future. At present, a student in this program could complete their General Studies program and any free electives via distal technology.

K. Resource Requirements

1. Faculty. Do not attach the curriculum vitae of each existing or additional faculty members to this proposal. (The institution must maintain and have current and additional primary and support faculty curriculum vitae available upon ACHE request for as long as the program is active.) *Please do provide a brief summary of Faculty and their qualifications specific to the program proposal.*

a) Please provide faculty counts for the proposed program:

Status	Faculty Type	
	Primary	Support
Current- Full Time	8	0
Current-Part Time	0	0
Additional-Full Time (to be hired)	1	1
Additional-Part Time (to be hired)	0	0

b) Briefly describe the qualifications of new faculty to be hired.

_Ph.D in Computer Science, Cyber Security area preferred.

2. Equipment. Will any special equipment be needed specifically for this program?

Yes No

If "Yes", please list:

The cost of the new equipment should be included in the table following (Section K.).

3. Facilities. Will any new facilities be required specifically for the program?

Yes No

If "Yes", please list. Only new facilities need be listed. Their cost should be included in the table following (Section K.).

A new lab dedicated to this program will be needed. The monies for this lab are noted in the budget worksheet below under "facilities".

4. Library. Are there sufficient library resources to support the program?

Yes No

Please provide a brief description of the current status of the library collections supporting the proposed program.

The library subscribes to a number of digital journal databases that include computer science, computer security, criminal justice, computer engineering, etc.

If "No", please briefly describe how any deficiencies will be remedied; include the cost in the table following (Section K.).

5. Assistantships/Fellowships. Will you offer any assistantships specifically for this program?

Yes No

If "Yes", how many assistantships will be offered? Be sure to include the amount in the table following.

Number of assistantships offered

Be sure to include the cost of assistantships in the table following (Section K.).

6. Program Budget. The proposal projected that a total of \$ in estimated new funds will be required to support the proposed program.

A projected total of \$ will be available to support the new program.

L. New Academic Degree Program Proposal Summary Form

- In the following “NEW ACADEMIC DEGREE PROGRAM PROPOSAL SUMMARY” table, please provide a realistic estimate of the costs of the program.
- This should only include the additional costs that will be incurred, not current costs.
- Indicate the sources and amounts of funds available for the program’s support.
- DO NOT LEAVE ANY PORTION/SOURCES OF THE NEW FUNDS OR FUNDS AVAILABLE BLANK. ENTER “\$0” IF THERE ARE NO NEW FUNDS NEEDED OR NO FUNDS AVAILABLE.
- THERE MUST BE AN ACTUAL DOLLAR AMOUNT PROVIDED FOR TUITION, SINCE THOSE FIGURES REPRESENT PROJECTED ENROLLED STUDENTS.
- **If it is stated that new funds are requested or if it is a reallocation of resources, please explain directly below from what source(s) the funds for the proposed new program, (e.g. faculty, equipment, etc.) will be attained.**
- **If tuition is used to support the program, what start-up revenue source will be used to initiate the program.**
- **Also, include enrollment and completer projections.**
- New enrollment headcounts are defined as **unduplicated** counts across years. For example, if “Student A” would be initially enrolled in the program in year 2, and again is enrolled in the program in years 4 and 5; “Student A” is only counted in the new enrollment headcount in year 2.
- Total enrollment headcounts represent the actual number of students enrolled (both part-time and full time each year. This is a **duplicated** count).

NEW ACADEMIC DEGREE PROGRAM PROPOSAL SUMMARY

INSTITUTION Troy University
 PROGRAM Cyber Security Program

ESTIMATED NEW FUNDS REQUIRED TO SUPPORT PROPOSED PROGRAM

	Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
FACULTY	<u>75000</u>	<u>75000</u>	<u>75000</u>	<u>75000</u>	<u>75000</u>	<u>375000</u>
LIBRARY	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
FACILITIES (LAB)	<u>25,000</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>25000</u>
EQUIPMENT	<u>20000</u>	<u>5000</u>	<u>5000</u>	<u>10000</u>	<u>5000</u>	<u>45000</u>
STAFF	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
ASSISTANTSHIPS	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
OTHER	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
TOTAL	<u>100000</u>	<u>85000</u>	<u>85000</u>	<u>90000</u>	<u>85000</u>	<u>\$445000</u>

SOURCES OF FUNDS AVAILABLE FOR PROGRAM SUPPORT

	Year 1	Year 2	Year3	Year 4	Year 5	TOTAL
INTERNAL REALLOCATIONS	<u>5000</u>	<u>5000</u>	<u>5000</u>	<u>0</u>	<u>0</u>	<u>15000</u>
EXTRAMURAL	<u></u>	<u></u>	<u></u>	<u></u>	<u></u>	<u></u>
TUITION	<u>150000</u>	<u>300000</u>	<u>450000</u>	<u>650000</u>	<u>850000</u>	<u>2,400000</u>
TOTAL	<u></u>	<u></u>	<u></u>	<u></u>	<u></u>	<u>\$2,415000</u>

ENROLLMENT PROJECTIONS AND DEGREE COMPLETION PROJECTIONS

Note: "New Enrollment Headcount" is defined as unduplicated counts across years.

	Year 1	Year 2	Year 3	Year 4	Year 5	<u>5-YEAR AVERAGE</u>
FULL TIME HEADCOUNT	<u>10</u>	<u>20</u>	<u>40</u>	<u>60</u>	<u>80</u>	<u>41</u>
PART TIME HEADCOUNT	<u>5</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>~10</u>
TOTAL HEADCOUNT	<u>15</u>	<u>30</u>	<u>50</u>	<u>70</u>	<u>90</u>	<u>51</u>
NEW ENROLLMENT HEADCOUNT	<u>15</u>	<u>15</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>90</u>
DEGREE COMPLETION PROJECTIONS	<u>0</u>	<u>0</u>	<u>0</u>	<u>15</u>	<u>25</u>	<u>AVERAGE 8</u>

B.S. in Cyber Security Program (54-hour)

Area I (6 hours)

ENG 1101 (3) Composition and Modern English I, or placement in ENG 1103 Honors English Composition I

ENG 1102 (3) Composition and Modern English II, or placement in ENG 1104 Honors English Composition II

AREA 11 (12 hours)

Required

1000-2000 level course within Literature (3 hours)

1000-2000 level course with an expanded historical and cultural scope in the Fine Arts, including the disciplines of Art, Music, Theatre, Film or other Fine Arts areas (hours).

Any 1000-2000 level courses with an expanded historical and cultural scope in the Humanities / Fine Arts disciplines, including Classics, Communication, Dance, English, Foreign Languages, Interdisciplinary Studies, Music, Nursing, Philosophy, Religion, Sign Language, Theatre or other Humanities/ Fine Arts areas (6 hours).

AREA III (12 hours)

MTH 1125 (4) Calculus I

Select One Sequence with Labs

CHM 1142 3 General Chemistry I

CHM L142 1 General Chemistry I Lab

CHM 1143 3 General Chemistry I

CHM L143 1 General Chemistry I Lab

OR

PHY 2252 3 General Physics I

PHY L252 1 General Physics I Lab

PHY 2253 3 General Physics II

PHY L253 1 General Physics II Lab

OR

PHY 2262 3 Physics I with Calculus

PHY L262 1 Physics I with Calculus Lab

PHY 2263 3 Physics II with Calculus

PHY L263 1 Physics II with Calculus Lab

AREA IV (12 hours)

Required:

Any 1000-2000 level course with a principal focus in History (3hours)

Any 1000-2000 level courses from the following Social Science disciplines: Anthropology, Business, Criminal Justice, Economics, Education, Finance, Geography, History, Hospitality, Tourism, Sport Management, Human Services, Interdisciplinary Studies, Leadership, Nursing, Nutrition, Political Science, Psychology, Religion, Social Work, Sociology or other Social Science areas (9hours).

AREA V (18-22 hours)

TROY 1101 1 Orientation

MTH 2210 3 Introduction to Statistics

CS 2250 3 Computer Science I

Required Courses (54 hours)

CJ 4472 3 Cyber Crime

CJ 4473 3 Computer Forensics

CS 2255 3 Computer Science II

CS 3323 3 Data Structures

CS 3333 Introduction to Cryptography

CS 3334 3 Foundations of Cyber Security

CS 3336 3 Information Assurance
CS 3360 3 Concepts of Object-Oriented Programming I
CS 3365 3 Introduction to Computer Organization and Architecture
CS 4420 3 Introduction to Database Systems
CS 4445 3 Data Communication and Networking
CS 4448 3 Operating Systems
CS 4452 3 Cyber Security Policies and Compliance
CS 4453 3 Ethical Hacking
CS 4454 3 Secure Software Development
CS 4455 3 Cyber Security Techniques and Practices
MTH 2215 3 Applied Discrete Math
Select one upper level (3000-4000 level) Computer Science elective