5-8-2012

SR-11-12-(31) 69 APC

Marshall University

ACADEMIC PLANNING COMMITTEE RECOMMENDATION

SR-11-12-(31) 69 APC

Recommends that the College of Sciences' Intent to Plan for the Bachelor of Science in Digital Forensics and Information Assurance be approved.

RATIONALE:

This program merits further development.

FACULTY SENATE CHAIR:

APPROVED BY THE FACULTY SENATE: _____ DATE: 5/8/12

DISAPPROVED BY THE FACULTY SENATE: _____ DATE: _____

UNIVERSITY PRESIDENT:

APPROVED: _____ DATE: 6/6/12

DISAPPROVED: _____ DATE: _____

COMMENTS: _____

_____

_____

_____

Executive Summary

Name of Institution: Marshall University

Date: April 23, 2012

Category of Action Required: Initial Approval

Title of Degree: Bachelor of Science in Digital Forensics and Information Assurance

Location: Huntington, West Virginia

Effective Date to Proposed Action: Spring 2013

Brief Summary Statement:

Bachelor of Science in Digital Forensics and Information Assurance

Marshall University Department of Integrated Science and Technology

Marshall University's Department of Integrated Science and Technology (IST) is requesting approval to plan a new baccalaureate degree in Digital Forensics and Information Assurance. This new baccalaureate program will be the first of its kind in the state of West Virginia.

The nation's economy is highly dependent on technology. This heavy dependence has made us extremely vulnerable to cyber-attack, cyber-crime, and cyber-espionage. Both the public and private sectors are under relentless attack by nation states, criminal organizations, and individuals with ill intent. Our country and its digital infrastructure are not adequately prepared to fend off these attacks. Currently, there is a lack of qualified professionals in digital forensics to meet the demand. Marshall University has the opportunity to help fill this void.

The foundation for the addition of a program in Digital Forensics and Information Assurance is well established. The proposed program would be an extension of the recently developed and highly productive Computer Forensics initiative in the Department of Integrated Science and Technology (IST). This initiative was developed in collaboration with the MU Department of Criminal Justice and the Marshall University Forensic Science Graduate Program. Currently, this initiative serves IST students as an Area of Emphasis. Students from other MU departments, such as Criminal Justice, complete this Area of Emphasis as a Minor. Students will soon be able to acquire a Marshall University Certificate in this field.

IST and the nationally recognized Marshall University Forensic Science Graduate Program (MUFSGP) have been sharing curricular, faculty, and material resources since 2009. This partnership has been quite productive, resulting in applied research that reaches and benefits digital forensic examiners across the globe. Another byproduct of that collaboration is the Appalachian Institute of Digital Evidence (AIDE). AIDE is a not-for-profit organization that provides training and education for all the stakeholders that deal with digital evidence. These stakeholders include attorneys, judges, law enforcement, and private sector information assurance/security professionals.

The program proposed in this document benefits from its associations with the College of Science and the Department of Integrated Science and Technology. COS not only provides critical curricula for FEPAC accreditation, it also provides a well-established and experienced system for advising, student support, and retention. The Department of Integrated Science and Technology contributes an extensive array of computing and technology courses required for FEPAC accreditation.

The IST Department has developed significant learning spaces for this proposed Program. IST has three state of the art computer labs along with a Learning Commons adaptable for extensive tablet use. This space can also be used to integrate new learning technologies into the proposed program. The IST Department has developed a computer forensics laboratory modeled after similar facilities used by the West Virginia State Police. The computer forensics laboratory is equipped with the same professional grade hardware and software that graduates will use when they are employed.

Digital Forensics and Information Assurance is a rapidly growing field of study. There is an exceptionally high demand for qualified professionals not only nationally, but globally. Digital forensic practitioners are needed in a variety of fields including law enforcement, military & intelligence, civil litigation, as well as internal or administrative investigations. Information assurance/security professionals are also in high demand in both the private and public sectors.

At the recent WV Homeland Security Summit, held at Marshall University, Homeland Security Secretary Janet Napolitano stated that she could hire every graduate in this field that Marshall could produce.

PART I: PROGRAM DESCRIPTION

The 122 hour program will reside in the Department of Integrated Science and Technology within the College of Science. The Digital Forensics and Information Assurance Program will contain a major in Digital Forensics and an optional, associated Area of Emphasis in Information Assurance that students may wish to complete in addition to the requirements of the major. The Program will be closely connected with the Marshall University Department of Criminal Justice and students in the Digital Forensics Major will have an option of bringing criminal investigative skills into their curriculum by minoring in Criminal Justice.

Accreditation is a major goal for the program. The program is being developed from the ground up with this specific objective in mind. Dr. Marc Rogers of Purdue University is an internationally known expert in this field and, along with Dr. Terry Fenger of the nationally accredited Marshall University Forensic Science Center, serves as advisor to this effort. Letters of support from both are appended to this document.

The Digital Forensics and Information Assurance program will meet the accreditation criteria established by the Forensic Science Educational Program Accreditation Commission (FEPAC). FEPAC is the preeminent accrediting body in all of forensic science education.

The program will also seek designation from the National Security Agency (NSA) and the Department of Homeland Security (DHS) as a National Center of Academic Excellence in Information Security Education (CAE/IAE).

The new Digital Forensic and Information Assurance Program will build on the success of the existing Computer Forensics Area of Emphasis within Integrated Science and Technology. The Digital Forensics major will build upon the foundation of the five existing computer forensics courses that have been refined through five years of instruction, assessment, and improvement.

This new program will afford West Virginia students the opportunity to obtain this degree while remaining in state and will eliminate the need for students to pay expensive out of state tuition. Furthermore, this program has strong potential to attract students from out of state.

A. Program Objectives

The Digital Forensics and Information Assurance program will provide students the opportunity to:

1. Acquire the skills and knowledge required to perform as a Digital Forensics and Information Assurance practitioner at the entry level.

2. Recognize the need for continuous professional development and life-long learning.

3. Develop critical thinking skills that can be used in digital forensic analysis and investigation.

4. Develop critical thinking skills that can be used in the defense of our nation's digital infrastructure.

5. Prepare to be effective "expert witnesses" in that they possess not only the technical skills and abilities necessary, but also have the ability to explain complex subject matter to a lay audience.

6. Demonstrate effective written and oral communication skills.

B. Program Identification

CIP Code: 43.0116

Title: Cyber/Computer Forensics and Counterterrorism.

Description: A program focusing on the principles and techniques used to identify, search, seize and analyze digital media and to conduct cyber investigations against criminal and terrorist activity. Includes instruction in computer boot processes and drives, jumper setting, file access and reconstruction, hacking, network systems, cryptography, programming, investigative techniques, forensic imagery, web-based investigation methods, cyber-terrorism, and applicable laws and administrative procedures.

C. Program Features

The Digital Forensics and Information Assurance program will be the first of its kind in the State of West Virginia. The degree will consist of 122 undergraduate credit hours that can be completed in a four-year period.

- **Significant Hands-on Learning Experiences** – The program integrates significant learning opportunities using industry standard tools that will be encountered upon entering the workforce. This experience will significantly improve the student's knowledge and skill set, and their employability.

- **Critical Thinking/Problem Solving** - Much of the practitioners time is committed to "out think" criminals who are constantly developing new ways to hide illicit materials and/or to infiltrate critical, secure information.

- **Communication** – The program prepares students to effectively communicate complex technology to a layperson (i.e. the judge, jury, attorneys, etc.). This is done through writing intensive courses and multiple opportunities to deliver presentations both in and out of class.

- **AccessData Certification** – Students are afforded the opportunity to sit for the AccessData Certified Examiner (ACE) test. Passing this test allows the student to leave the university with a professionally recognized credential in addition to their degree.

- **Appalachian Institute of Digital Evidence (AIDE)** – AIDE is a not for profit organization that provides training and research for all practitioners that deal with digital evidence. These include lawyers, judges, law enforcement, corporate information assurance/security professionals, etc. The organization is located at Marshall University. AIDE holds a yearly, weeklong training conference which students are encouraged to attend. Students may join AIDE (and attend the annual meeting) for minimal cost ($20/year). Presenters are brought in from across the country. Previous presenters have included representatives of the FBI Laboratory in Quantico, Purdue University, AccessData Corporation, Charleston law firms, and many others.

- **AccessData (AD) Research/Internship Program** – Marshall University is the only institution of higher education that conducts applied research for AD. AD is one of the top two providers of digital forensic software and training world-wide. Our research results are incorporated into their training materials and the tool itself. This program gives students the opportunity to intern with AD from here on campus as opposed to traveling to their headquarters in Linden, Utah.

D. Program Admission Standards

Prospective students who wish to apply for admission to the Digital Forensics and Information Assurance Program must meet the general admission requirements for the university as well as those for the IST Department and the College of Science (21 Composite ACT, 21 Math ACT). A comparison of demand for this program relative to available resources indicates that demand could rapidly exceed the university's capability to deliver the program. Consequently, we strongly recommend that initially the number of incoming majors be capped at 25 per year (includes new freshman and transfer enrollments). These students will be chosen based on a combination of ACT scores and high school GPA.

Students may enter the program in one of four ways: (1) direct admit at freshman level progressing through all levels of coursework and required hours; (2) enter post-baccalaureate with a degree from Marshall or another university; (3) transfer from accredited university; (4) transfer from another undergraduate program within Marshall.

Students entering the program through non-traditional routes of acceptance such as post-baccalaureate or transferring will be required to complete the Digital Forensics core courses and meet the requirements for graduation and granting of degree. Transfer students will be evaluated for level of acceptance depending upon coursework completed and will need to meet requirements for graduation.

Due to the sensitive nature of the work, it is standard industry practice to require potential employees to successfully pass a background investigation. This program will operate with the same philosophy. To participate in the discipline-specific 300 and 400 level courses of this program, all prospective students will have to successfully pass a background check and provide the department with two (2) letters of reference. The letters of reference may be either personal or professional. Letters must be provided by individuals who have direct knowledge of the prospective student's character and work ethic. Reference letters from family members will not be accepted.

Students will bear the $55.00 cost of the background check. The background check is done via CertifiedBackground.com. This system is utilized by the Marshall University Forensic Science Center and has been very successful. Students in these fields will most likely have to pass a background check as a condition of their employment.

E. Program Outcomes

Students must first meet General Education requirements for the University and College of Science, complete the specific technology oriented core of IST courses, and courses specific to the Digital Forensics major. Students will also have the option of completing the Information Assurance Area of Emphasis.

IST has as its primary goal the education of undergraduates with sufficient in field knowledge and technical skills so as to be meaningfully employed in science and technology. In addition, students from this Program will acquire skills and knowledge in cyber-crime and information assurance/security.

The following outcome measures have been established for the Digital Forensics and Information Assurance program:

- Eighty-five percent or more of all students admitted will successfully complete the program within four years.

- Within six months of successful completion of the BS in Digital Forensics and Information Assurance, 90% of graduates will be employed in a Digital Forensics, Information Assurance, or Information Security field, or be admitted to a graduate program.

F. Program Delivery

All coursework will be offered on the Huntington campus. Some coursework will be available online as e-courses. The program will be delivered with substantial amounts of lab time, allowing students opportunities to apply the principles and techniques that they have learned, using an array of industry standard tools.

PART II: PROGRAM NEED AND JUSTIFICATION

A. Relationship to Institutional Goals/Objectives

The goals and objectives of the proposed Digital Forensics and Information Assurance Program are well aligned with those of the university. This agreement is well stated in the university's strategic plan "Owning the Opportunity, MU-2010", which states "Marshall University will continue to serve the needs of the state and the region, and move toward increased national prominence by fostering academic excellence through strong academic programs... [and] will develop new programs that provide unique opportunities for advanced study in fields important to Marshall University and to the vitality of the region, state, and nation."

B. Existing Programs

Based on Internet research, there were no other schools found within the state of West Virginia that offer a major or minor at the undergraduate level in Digital Forensics. West Virginia University offers a graduate certificate in Computer Forensics. Marshall University currently offers an Area of Emphasis and minor in Computer Forensics within the Department of Integrated Science and Technology. The new Digital Forensics and Information Assurance program will allow students who are currently within the Computer and Information Technology major's Computer Forensics Area of Emphasis to move to the Digital Forensics major, a natural transition for those students. There are additional computer programs on the Huntington campus, but none of these programs has a Digital Forensics and Information Assurance or Information Security emphasis, minor, or major.

C. Program Planning and Development

The Digital Forensics and Information Assurance program and curriculum are being developed based on the accreditation standards put forth by the American Academy of Forensic Sciences, Forensic Science Education Programs Accreditation Commission (FEPAC)., The intent is to achieve designation as a National Center of Academic Excellence in Information Security Education (CAE/IAE). This designation is awarded through a joint program operated by the Department of Homeland Security and the National Security Agency.

As part of the planning process, IST faculty members have been consulting with Dr. Marcus Rogers, the Director of the Cyber Forensics Program at Purdue University. Dr. Rogers has extensive experience in developing curriculum that conforms to the FEPAC and DHS/NSA standards. Dr. Rogers performed a gap analysis, comparing MU's current curriculum with these standards. This analysis was used as part of the program planning process.

It is the intent of the program to seek the previously listed accreditation and designation as soon as the required conditions have been met.

The Marshall University Forensics Science Center recently had the first program in the world earn FEPAC accreditation as a Digital Forensics program. Their Digital Forensics program has been accredited by FEPAC through 2017. IST has an excellent working relationship and Memorandum of Understanding (MOU) with the MUFSC, and will learn from their experience to successfully complete the FEPAC accreditation process.

The Department of Integrated Science and Technology has a strong reputation for providing quality programs, and this program is being developed to adhere to these same high standards.

D. Clientele and Need

There are several organizations for professionals in this field, including: the American Academy of Forensic Sciences, the High Technology Crime Investigators Association, the Scientific Working Group on Digital Evidence, the Association of Digital Forensics, Security and Law, Homeland Security, the FBI, and the Consortium of Digital Forensics and Information Security Specialists. Graduates of this program will be employable within each of these groups and others.

Without the benefit of extensive student recruitment or having an independent degree program, the number of students choosing Computer Forensics as an Area of Emphasis at Marshall University has risen 93% since 2008. The numbers break down by year as follows:

Fall 2008 - 16
Fall 2009 - 15
Fall 2010 - 22
Fall 2011 - 31

In four years, capacity of the program has been exceeded and classes are routinely overloaded. With the addition of two new faculty (searches currently in progress) we will be able to accept additional students into the program.

Just recently, Homeland Security Secretary, Janet Napolitano, visited campus and informed Dr. Kopp that she could hire every graduate we could produce. There is a nationally recognized need for this program.

E. Employment Opportunities

According to the Department of Labor's Bureau of Labor Statistics, professionals in this field reported zero unemployment in the first two quarters of 2011. The number of IT security analysts rose 16% (from 37,000 to 43,000) during the April-to-June time period. The Department of Homeland Security and the National Security Agency plan to hire 1,000 and 3,000 new employees in this field respectively.

There is an abundance of agencies/organizations looking for qualified applicants, including but not limited to: the Federal Bureau of Investigation, the Department of Energy, the National Security Agency, the Central Intelligence Agency, the Department of Homeland Security, all military branches, National White Collar Crime Center, private companies such as Information Security Specialists, Inc., and Kroll OnTrack, National Laboratories such as Sandia and Los Alamos National Laboratories, state and local law enforcement agencies, etc.

F. Cooperative Agreements

The Department of Integrated Science and Technology has partnered with several organizations and entities in regard to Digital Forensics: the West Virginia State Police, AccessData Corporation, the Marshall University Forensic Science Center, The West Virginia Prosecuting Attorneys Institute, the Huntington Police Department, and the Beckley Police Department.

G. Alternatives to Program Development

If Marshall University does not pursue the development of this course students interested in seeking a higher education degree in this field of study will have no alternative but to leave WV to attend another institution or to complete an online program at a greater expense to them. Given the totality of the circumstances, this presents a unique opportunity for the university to position itself as a leading academic institution in Digital Forensics.

PART III: PROGRAM IMPLEMENTATION AND PROJECTED RESOURCE REQUIREMENTS

A. Program Administration

The program will be administered by the Department of Integrated Science and Technology. Currently, IST is organized into multiple sub-disciplines including Computer & Information Technology, Biotechnology, Environmental Science, and Natural Resources and Recreation Management. IST proposes that the Digital Forensics and Information Assurance program be developed as an additional program in IST. The program will be overseen by a Program Director.

B. Program Projections

The number of Computer and Information Technology majors within IST has grown significantly. In the Fall of 2007, the number of majors totaled 49. By the Fall of 2011, that figure had risen to 98. If this program is approved and implemented, the existing students within the Computer and Information Technology major's Computer Forensics area of emphasis would be given the option of majoring in Digital Forensics. Moving these 31 Computer Forensics students to the program brings the number of CIT students down to 67. At the current rate of growth, CIT is projected to have 119 majors by Fall 2016 without Computer Forensics students since they will become part of this new program

The number of students in the Computer Forensics area of emphasis has also seen a dramatic increase since 2008, rising from 16 to 31 as of Fall 2011.

Our projections start with 15 freshman Digital Forensics Majors in the Fall of 2012. We fully anticipate these numbers rising as we advertise, moving past our initial cap of 25 new majors per year to 30 freshmen by Fall 2016. The numbers of freshmen, sophomores, juniors, and seniors are based on current enrollments and growth predictions factoring in an 85% retention rate. Note that if these projections hold true, the Integrated Science and Technology Department's computer majors (Computer and Information Technology and Digital Forensics and Information Assurance) would have 209 majors by Fall, 2016, nearly double the current number of majors within our current CIT major. Should the numbers grow beyond 200, hiring an additional faculty member will become necessary.

We project the following increases for each area of emphasis within CIT: 10% in Computer Application Development, 20% in Web Development, and 25% in Game Development.

See Appendix B for full details.

C. Faculty Instructional Requirements

Our Faculty Instructional Requirements are based on the enrollment figures and projections discussed above and detailed in Appendix B. With the addition of the two new faculty positions that are currently being advertised, and a full-time temp instructor, all instructional requirements can be met within established faculty teaching loads. Based on our projections, each faculty member would be available for three hours of reassigned time every four semesters for additional research.

By Fall 2014, if enrollment continues to rise as predicted, we project a need for two additional faculty positions above the positions we are currently hiring to handle Integrated Science and Technology's integrated statistics, living systems, energy, and connections courses, all of which are required by students within each of the sub-disciplines of IST.

See Appendix C for details.

D. Library Resources and Instructional Materials

Library resources currently offered at MU are sufficient. Students in these programs will have access to all MU library resources normally afforded students. Additional library needs will be assessed by the program director on an annual basis.

E. Support Service Requirements

All support service requirements will be jointly determined by the Director of the Digital Forensics and Information Assurance program, the IST Chair, and the Dean. One additional support staff will be required to support the faculty and to maintain the required documentation to achieve and maintain accreditation. The volume of documentation required to achieve and maintain accreditation is significant. It requires continuous monitoring and updates. The amount of work required can easily occupy a single full-time support person.

F. Facilities Requirements

The university will be responsible for all facilities necessary to operate and maintain the Digital Forensics and Information Assurance program. The IST Digital Forensic laboratory is a state-of-the-art facility currently housed in Morrow Library. An Information Assurance/Security lab is currently being developed in Prichard Hall, room 207.

We project that expanded enrollment will require changing most of the existing Digital Forensic Science courses to a lecture/lab format. This change in course structure will also better fit FEPAC requirements for specific 1:1 proportion between lecture and lab instruction in critical courses. New dedicated and shared space has already been allocated for this program in the new Applied Engineering building, which will be constructed over the next three years. In the short-term, lecture and lab space is available in our existing classrooms in the Morrow Library and Prichard Hall. The new spaces are necessary for growth and expansion of each of the Computer and Information Technology and Digital Forensics courses.

G. Operating Resource Requirements

New program space will need appropriate furnishings such as desks and chairs.

H. Source of Operating Resources

Faculty, personnel and facility resources sufficient to offer the program are estimated in the attached budget. Operational funds (other than personnel costs) will be derived, in large part, from the College of Science. In addition, we feel that there will be significant demand from non-traditional students (e.g. law enforcement professionals, attorneys, paralegals, private sector professionals) for certificate offerings. Such offerings could be delivered online and/or during summer sessions using a summer institute model, which IST and CJ have participated in the past. to help offset instructor costs and provide additional funds for operation of the undergraduate program and faculty development.

I. Budget Narrative

The attached budget (Appendix E) estimates the costs associated with adding a major in Digital Forensic (DFS) Science to the Department of Integrated Science & Technology (IST). The DFS curriculum has been designed to qualify for accreditation through the Forensic Education Programs Accreditation Council (FEPAC). Cost estimates are included for Personnel, Equipment, Software Licenses, Faculty Training and Other, with details of each category and line included below. The column headed "Current" indicates FY12 expenditures that will be associated with the DFS major going forward. Additional columns estimate expenditures through FY17, including estimated additional costs due to personnel raises, and inflation.

Personnel. Mr. John Sammons, Mr. Brian Morgan, Dr. SeungJin Lim, and Dr. Hamid Chahryar are currently teaching courses in IST and would contribute to the DFS major. Their salaries are listed under "Current". Dr. Michael Little is presently Chair of IST. Upon his retirement at the end of the current academic year (AY12), the college intends to hire a one-year, temporary assistant professor in position number 237 to contribute to DFS. We have determined that a temporary hire in this position will give the department an opportunity to assess demand in IST majors prior to committing another faculty line to this program. The positions numbered 593, 259 and 295 have been committed by Academic Affairs to IST for the purpose of establishing the DFS program. The funds associated with each line are also shown under "Current".

Expenditures in Budget Year 2013 are based on discussions with Provost Ormiston and with Dr. Terry Fenger, Director of the Marshall University Forensic Science Graduate Program. As mentioned above, Dr. Ormiston has committed three existing lines (position numbers 593, 259, and 295) to the undergraduate forensic science program, and we are planning to dedicate two of those lines to junior DFS faculty positions starting in AY13. It is important to note that these are not new positions, and that funding is already associated with each line. We believe that the requested salaries of $65K per 9 months will be near the minimum required to attract qualified faculty in this field. Therefore, we have also requested an adjustment in Mr. Sammons base salary in 2013, when he will be directing the DFS major, to avoid inversion of the program director by junior faculty members.

The budget also indicates the need for an additional administrative support position. This position was added to the budget after discussions with Dr. Fenger, who has extensive experience with FEPAC accreditation. This position is required due to the stringent FEPAC record keeping and reporting

requirements, and moving forward without additional clerical support will put the accreditation of the program at extreme risk. Funding for this position in 2013 may be phased in, provided on a one-time basis, or budgeted as a shared expense with the college. Beyond 2013, per planning discussions with Provost Ormiston, we are requesting the transfer of a university staff position to IST to fill this need. In addition, we have estimated the need for adjunct instructors to help with lab instruction. This would allow the program to grow by staffing relatively large lecture classes with senior faculty members, and then providing hands-on laboratory experience in relatively small lab sections staffed by both senior faculty and adjunct instructors.

Expenditures in Budget Year 2014 reflect the addition of the third dedicated faculty line. As indicated above, funding is already associated with this line (position number 593). The hire in this line would serve as director of undergraduate forensic science programs, and is anticipated to take on leadership of the graduate Forensic Science Program upon Dr. Fenger's retirement. Funding and hiring to this position are extremely important for the viability of the undergraduate offerings, and will be vital if the undergraduate and graduate forensic science programs are to be aligned after the retirement of Dr. Fenger.

There are no additional new personnel expenditures anticipated in Budget Years 2015 through 2017. The budget reflects a 2% salary increase per year in each line in an attempt to estimate future personnel costs.

Equipment. Budget Year 2013 estimates the initial investment required to equip computer laboratories for the DFS major. The College of Science is requesting an initial equipment investment of $61,241 (50% of initial cost estimate) from Academic Affairs. The remainder of the 2013 equipment budget will be funded from CoS lab fees and/or indirect cost recovery (ICR) funds generated by DFS faculty activities. Lifecycle replacement of program computers will begin in FY 2016, with one-third of computers replaced each year. Lifecycle replacement will be funded through departmental and college lab fee and ICR funds. Equipment costs are estimated to increase by 2% per year.

Software Licenses. The costs of current software licenses are listed under the Current Budget Year. Two additional software packages, Mobile Phone Examiner and DF Software Tools, will be added in support of the DFS major starting in Budget Year 2013. It is anticipated that license fees will be funded from CoS lab fees. License fees are estimated to increase by 2% per year.

Faculty Professional Development. Digital Forensics is a constantly and rapidly changing field. Annual faculty development and training activities are vital to providing state-of-the-art education for DFS students and to retain FEPAC accreditation. Funding for annual faculty development is requested at approximately one development activity (e.g. conference workshop) per DFS faculty member per year. Funds for faculty development are anticipated to be provided from various sources, including but not limited to, Academic Affairs, CoS operating funds, IST operating funds, CoS summer school net revenues, and Faculty Senate faculty development funds.

Other. Other anticipated costs for the addition of the DFS program include incremental operating costs associated with the addition of three new faculty positions (based on current IST costs per position), and FEPAC membership fees. CoS is requesting the increase in operating funds from Academic Affairs. FEPAC fees will be paid from CoS indirect cost recovery funds.

Summary. Although the addition and operation of the Digital Forensics Science program requires some university investment, the majority of the funding is associated with existing lines. Other than an initial, one-time investment in equipment of approximately $61K, and a commitment to base funding to support operating costs of approximately $10 - 15K per year, the program will be supported using existing lines, student fees (existing CoS lab fees), and other revenues generated by DFS faculty activities.

PART IV: OFFERING EXISTING PROGRAMS AT NEW LOCATIONS

Not Applicable

PART V: PROGRAM EVALUATION

A. Internal Evaluations

An assessment plan has not been developed for this new program, but IST is committed to developing such a plan in accordance with the procedures set forth by Academic Affairs. Assessment for the Digital Forensics and Information Assurance Program will be the current assessment process used for all programs associated with IST. This assessment protocol has been approved for and successfully applied to all of these programs within IST. These programs include Integrated Science and Technology, Environmental Science and Natural Resource and Recreation Management.

As an applied science with a focus on technology integration, Digital Forensics and Information Assurance share the basic learning paradigms of all programs in Integrated Science and Technology. The three learning domains unique to IST but required for technology proficiency and science integration are: proficiency with the most current computer applications and associated technologies (Technology Core), content knowledge within the area of specialization (Strategic Sector), and the capacity to apply knowledge in a work or research environment (Senior Experience Sector).

All three of these domains must be assessed, but the current level of assessment includes evaluating student capacity to use current technologies (Technology Core) and the capacity to plan and execute a project in either a work or research environment (Senior Experience Sector).

A. External Evaluation

Both the FEPAC accreditation and NSA/DHS designation are renewed every five years. The FEPAC reaccreditation process includes a significant document review and onsite visit. These will serve as our external evaluation.

B. Accreditation Status

The proposed program will not be accredited at launch, but will apply for accreditation through FEPAC upon first opportunity (estimated Fall 2018). FEPAC standards require a program graduate two classes prior to being considered for accreditation. Accreditation is a meticulous and labor intensive process and will require the attention of the Digital Forensics and Information Assurance Program Director and the staff position requested in this proposal. This provides a similar level of support to that used by MUFSC.

C. **Termination of Program**

All program termination procedures will be guided by MU policies on program termination located in the undergraduate student handbook and MU's Greenbook. Any decision to terminate this program would require that sufficient coursework be taught to complete the degree for all accepted students, or arrangements be made with another institution offering a like degree to accept all students enrolled.

APPENDIX A

Bachelor of Science in Digital Forensics and Information Assurance Proposed Curriculum

Major in Digital Forensics

Fall Semester	Hours		Spring Semester	Hours
IST 160 - Intro to Programming	3		MTH PR or Free Elective (see ACT req. of MTH140)	3
IST 111 - Living Systems - Core II University	4		IST 163 - Programming C++	3
IST 120 - Connections I (CT) - Core I	3		FYS 100 - First Year Seminar - Core I	3
ENG 101, English Composition I - Core II	3		IST 264 - Technology Foundations	3
Social Science (recommended as Multicultural or International)-Core II	3		IST 260 - Instrumentation	3
Total	**16**		**Total**	**15**

Fall Semester	Hours		Spring Semester	Hours
IST 263 - Web Programming	3		MTH 140 - Applied Calculus - Core II	3
Fine Arts Elective (ART112/THE112/MUS142) - Core II	3		ENG 201 - English Composition II - Core II	3
IST 130 - Analytical Methods I (Statistics)	4-Jan		IST 224 - Intro to Forensic Science (Writing Intensive)	4
CMM 103/104H Communications - Core II	3		IST 212 - Energy - Core II Science	3
Free Elective if desired	3		IST 220 - Connections II (CT) - Core I	3
Total	**16**		**Total**	**16**

Fall Semester	Hours		Spring Semester	Hours
IST 365 - Database Management	3		MGT 320 - Principles of Management	3
IST 362 - Network Protocols	3		IST 363 - Network Administration	3
CJ 312 - Criminal Investigation	3		IST 447 - App. Digital Evidence/E-Discovery	4
IST 463 - Digital Forensics Practicum	4		Humanities/Lit (Writing Intensive) - Core II	3
ENG 354 - Technical Writing	3		CJ326 - Computer Crime	3
Total	**16**		**Total**	**16**

Fall Semester	Hours		Spring Semester	Hours
IST 490 - Capstone	3		IST 491 - Senior Project II or IST470 - Internship	3
IST 448 - Forensic Uses/Digital Images	3		IST 449 - Digital Forensics Investigation	3
IST 467 - Mobile Device Forensics (NEW COURSE)	4		IST 301 - Public Service	1
IST 367 - Information Security (NEW COURSE)	3		Enrichment - Technical Elective	3
IST 464 - Network Security/Cybercrime	3		IST 462 - Network Forensics (NEW COURSE)	4
Total	**16**		**Total**	**14**

***** TOTAL HOURS REQUIRED – AT LEAST 122 OF WHICH 40 MUST BE 300 – 499 LEVEL**

APPENDIX B

Program Projections

IST Computer and Information Technology Majors - History and Projections

SI20 - Computer and Information Technology Major

	Fall 2007	*Fall 2008*	*Fall 2009*	*Fall 2010*	*Fall 2011*	**Fall 2012*	**Fall 2013*	**Fall 2014*	**Fall 2015*	**Fall 2016*
Comp App Dev		6	6	9	13	15	17	19	21	23
Web App Dev	1	7	6	9	13	17	21	25	29	33
Game Dev		4	9	15	24	28	35	42	50	60
Comp Forensics	8	16	15	22	31	0	0	0	0	0
Undecided	40	23	21	21	17	16	12	9	6	3
TOTAL:	49	56	57	76	98	76	85	95	106	119

CIT Major Predictions by Class

Freshmen					10	15	25	27	30	33
Sophomores					22	17	21	19	25	28
Juniors					21	21	19	18	24	27
Seniors					45	23	20	31	27	31
Total					98	76	85	95	106	119

DF - Digital Forensics Major

Freshmen					0	15	18	22	26	30
Sophomores					5	4	16	17	19	22
Juniors					9	8	10	14	16	18
Seniors					17	12	14	16	18	20
Total					31	39	58	69	79	90

* = Predictions based on current enrollment trends in CIT & 25 entering freshmen each year in DF & 85% retention

APPENDIX C

Faculty Instructional Requirements

Integrated Science and Technology's Computer and Information Technology and Digital Forensics Majors
5 Year Course Offering Plan, 2012-2017

Course	Title	Hrs	Fall 12	Spring 13	Fall 13	Spring 14	Fall 14	Spring 15	Fall 15	Spring 16	Fall 16	Spring 17
111	Living Systems	4	1		2		2		3		3	
120	Connections I	3	1		2		2		3		3	
130	Analytical I - Statistics	4	CIT2	CIT2	CIT2	CIT2	2	1	2	1	3	1
160	Intro to Programming	3	CIT1, IS, DF	CIT3, DF	CIT1, CIT1, DF	CIT1, CIT3	CIT1 , CIT1, CIT3	CIT3, DF	CIT1, CIT1, CIT3	CIT1, IS	CIT1, CIT1, CIT3	CIT3, IS
163	Programming Practicum	3		CITC, CIT3	CIT2	CITC, CIT3	CIT3	CITC, CIT3	CIT3	CITC, CIT3, CIT3	CIT2	CITC, CIT3, CIT2
212	Energy	3		1		1		2		2		2
220	Connections II	3		1		1		2		2		2
224	Forensic Science	4		1		1		2		2		3
236	Data Structures	3	CIT3		CIT3		CIT3		CIT3		CIT3	
238	Algorithms	3		CIT3		CIT3		CIT3		CIT3		CIT3
260	Instrumentation	3	CIT1	CIT1, CIT1	CIT1	CIT1, CIT1	CIT1	CIT1, CIT1	CIT1	CIT1, CIT1	CIT1, CIT3	CIT1, CIT2
263	Web Programming	3	CITC		CIT3, CIT3		CITC, CIT3		CIT3, CITC		CIT3, CITC	
264	Hardware Technology	3	DFC	IS, DFC	DFC, IS	DFC, IS	DFC	DFC, IS	DFC	DFC, DF	DFC	DFC, DFC
301	Public Service	1	CIT1	DFC	CIT2	DF	1	DFC	1	IS	1	DFC
303	.NET Programming	3	CIT3		CIT3		CIT2		CIT2			
332	Software Engineering I	3	CIT1		CIT1		CIT1		CIT1		CIT1	
333	Software Engineering II	3		CIT1		CIT1		CIT1		CIT1		CIT2
334	Programming Languages	3				CIT2		CIT2		CIT2		CIT2
360	Game Development I: 2D	3	CIT2		CITC		CIT2		CIT2		CIT2	
362	Network Protocols	3	IS		IS		IS		IS, IS		IS, CIT2	
363	Network Administration	3		IS		IS		IS		IS		IS
365	Database Management	3	CITC		CITC	DF	CITC	DF	CITC	DF	CITC	DF
423	GIS & Data Systems	3	1		1		1		1		1	
430	Electronic Commerce	3		CITC		CIT3		CITC		CIT3		CITC
436	Advanced Web Development	3		CIT3		CITC		CIT3		CITC		CIT3
438	Comp. Graphics for Gamming	3	CIT2		CIT2		CIT2		CIT2		CIT2	
439	Game Development II: 3D	3		CIT2		CIT2		CIT2		CIT2		CIT2
447	Search & Seizure Tech DE	4		DF		DF		DF		DF		DF
448	Forensic Uses of Digital Ima	3	DF		DF		DF		DF		DF	
449	Data Recovery and Analysis	3		DF		DFC		DFC		DFC		DF
460	Game Development III: AI	3		CIT2		CIT2		CIT2		CIT2		CIT2
463	Digital Computer Evidence	4	DF		DFC		DFC		DFC		DFC	
464	Network Security	3	IS		IS		IS		IS		IS	
466	Database Programming	3	CIT3				CIT2					
490	Senior Project I	3	DFC, DFC	DFC	DFC, DF	IS	DFC, 1	CIT2	DFC, DF	CIT2	DFC, 1	1
	NEW COURSES TO BE ADDED											
367	Information Assurance	3		IS			DF		DF		DF	
454	Network Defense	3			IS		IS				IS	
457	Network Penentration & Attack	3				IS		IS		IS		IS
461	Cyberwarfare	3					IS		IS		IS	
462	Network Forensics	4				DF		DF		DF		DF
467	Mobile Device Forensics	4			DF		DF		DF		DF	
	OFFERINGS TO BE COVERED:		8	8	5	8	9	7	10	7	12	8

* For 111, 120, 130, 212, 220, 224, 301, and 490 numbers represent sections needed for CIT/DF major coverage

Number of Sections to be Taught by each position per semester

DF = Digital Forensics	3	3	4	4	3	4	4	4	3	4
IS = Info Security	3	3	4	4	4	3	4	4	4	3
DFC = Dig Forensics Coordinator	3	3	3	2	3	3	3	2	3	3
CITC = CIT Coordinator	2	2	2	2	2	2	2	2	2	2
CIT1	4	3	4	4	4	3	4	4	4	3
CIT2	3	3	4	4	4	4	3	4	4	4
CIT3 = CIT Temp	3	4	4	4	4	4	4	4	4	4
	21	21	25	24	24	23	24	24	24	23

APPENDIX D

Digital Forensics Major – Core Course Descriptions

IST 264 – Technology Foundations: **3hrs** - This course introduces the student to the common hardware and technology that pervades business and society as a whole. Topics include pc's, networks, software, the internet, cellular phones, etc.

IST 362 – Network Protocols: **3hrs** - This course provides students with knowledge of network terminology, structures, topologies, protocols, and interfaces involving Local Area and Wide Area networks.

IST 363 – Network Administration: **3hrs** - Students will explore topics in network administration in a theoretical and practical way. Students will study hardware selection, platforms, languages, control, shared resources, security, anti-virus procedures, and methodologies.

***IST 368 - Case Studies/Topics in Information Security: 1hr** - An examination of current events, cases, and topics related to the practice of Information Security.

IST 447 – Applied Digital Evidence & Electronic Discovery: **4hrs –** Course provides basic information to the student in the proper procedures for seizing digital evidence used in the commission of crime. Includes legal issues peculiar to seizing digital evidence.

IST 448 – Forensic Uses of Digital Images: **3hrs** - This course will introduce the students to the principals of digital imaging particularly as they apply to forensic science.

IST449 – Data Recovery and Analysis: **3hrs** - This course teaches students how information is recovered from electronic devices and the forensic techniques used to perform forensic examinations. In addition, legal issues regarding electronic data will be discussed.

IST 463 – Digital Evidence and Investigations: **4hrs** - Concepts of computer forensics, including handling digital evidence, case preparation, forensic imagining, data recovery, password cracking, e-mail analysis, and report writing. Proper usage of different forensic tools is emphasized.

***IST 467 – Mobile Device Forensics: 4hrs –** Identification, preservation, collection, analysis, and reporting techniques and tools and used in the forensic examination of mobile devices such as cell phones and GPS units.

** Denotes new course.*

APPENDIX E

Proposed Budget

Intent to Plan - Projected Expenses **BS Degree in IST** **Program in Digital Forensic Science**

Budget Category / Budget Year		Current	2013	2014	2015	2016	2017
Personnel - Salary							
Title	**Name**						
Director	(pos 593)	73,257	0	88,000	89,760	91,555	93,386
Senior Digital Forensics Faculty	J. Sammons	62,000	69,000	70,380	71,788	73,223	74,688
Junior Faculty Digital Forensics	(pos 259)	61,315	65,000	66,300	67,626	68,979	70,358
Junior Faculty Information Security	(pos 295)	67,261	65,000	66,300	67,626	68,979	70,358
Administrative Support, Secretary	TBD	0	28,000	28,560	29,131	29,714	30,308
CIT Faculty (Term)	(pos 237, Little)	81,800	55,000	56,100	57,222	58,366	59,534
CIT Program Coordinator	B. Morgan	68,581	69,953	71,352	72,779	74,234	75,719
CIT Faculty	S. Lim	91,138	92,961	94,820	96,716	98,651	100,624
CIT Faculty	H. Chahryar	77,935	79,494	81,084	82,705	84,359	86,047
Adjunct Instructors (lab instruction)	TBD	0	8,000	8,160	8,323	8,490	8,659
Personnel - Fringe							
Director	26%	19,047	0	22,880	23,338	23,804	24,280
Senior Digital Forensics Faculty	26%	16,120	17,940	18,299	18,665	19,038	19,419
Junior Digital Forensics Faculty	26%	15,942	16,900	17,238	17,583	17,934	18,293
Junior Information Security	26%	17,488	16,900	17,238	17,583	17,934	18,293
Administrative Support	26%	0	7,280	7,426	7,574	7,726	7,880
CIT Faculty (Term)	26%	21,268	14,300	14,586	14,878	15,175	15,479
CIT Program Coordinator	26%	17,831	18,188	18,551	18,922	19,301	19,687
CIT Faculty	26%	23,696	24,170	24,653	25,146	25,649	26,162
CIT Faculty	26%	20,263	20,668	21,082	21,503	21,933	22,372
Adjunct Instructors (lab instruction)	26%	0	2,080	2,122	2,164	2,207	2,251
Personnel Sub-Total		435,498	365,400	483,588	493,260	503,125	513,187
Equipment							
Computers - Information Security Laboratory			22,100			7,809	7,965
Computers - Digital Forensics Laboratory			27,300	25,549		9,646	18,866
Misc Digital Forensics Hardware			19,086			6,744	6,878
Cell Phone Kits			21,996	11,992		7,772	12,165
Lab Furnishings			32,000				
Equipment Sub-Total		0	122,482	37,541	0	31,970	45,874
Software Licenses							
EnCase		466	475	485	494	504	514
FTK		2,500	2,550	2,601	2,653	2,706	2,760
Mobile Phone Examiner		0	2,500	2,550	2,601	2,653	2,706
CellBrite		1,000	1,020	1,040	1,061	1,082	1,104
DF Software Tools		0	1,000	2,500	1,040	2,600	1,080
Software Licenses Sub-Total		3,966	7,545	9,176	7,849	9,546	8,165
Faculty Training							
seven faculty * $2K per year (initial)		0	14,000	14,280	14,566	14,857	15,154
Training Sub-Total		0	14,000	14,280	14,566	14,857	15,154
Other							
Additional IST operating costs			10,162	15,243	15,547	15,858	16,176
FEPAC fees		0	0	5,000	0	0	
Other Sub-Total		0	10,162	20,243	15,547	15,858	16,176
	Estimated Total	**439,463**	**519,588**	**564,827**	**531,222**	**575,356**	**598,556**
Base Expenditures (Total - Equipment - Software - FEPAC fees)		435,498	354,282	513,111	523,373	533,840	544,517
New Additions to Base (requested from Academic Affairs)		0	20,242	61,510	62,740	63,995	65,275
One-Time Expenditures Requested from Academic Affairs		0	96,521				
One-Time & Lifecycle Costs to CoS		0	68,786	51,717	7,849	41,516	54,039

APPENDIX F

Information Assurance Area of Emphasis: Required Courses

IST 363 – Network Administration: **3hrs** - Students will explore topics in network administration in a theoretical and practical way. Students will study hardware selection, platforms, languages, control, shared resources, security, anti-virus procedures, and methodologies.

***IST 367 - Information Security: 3hrs** – Examination of the principles and practices of Information Security .

***** **IST 454 – Network Defense: 4hrs -** An in-depth examination of the principals, strategies, and tools used to defend, detect, and respond to a variety of common network attacks.

***** **IST 457 - Network Penetration and Attacks: 4hrs** – Students will explore tools and techniques used penetrate, exploit and infiltrate data from computers and networks.

***** **IST 461 – Cyber Warfare: 3hrs** - Broad examination of this new form of conflict including the role of nation states, the challenge of attribution, its potential impact on the physical world, and current government policy and doctrine.

***IST 462 – Network Forensics: 4hrs -** Examination of techniques and tools used to investigate, search, collect, analyze, and report on network based breeches and events.

APPENDIX G

Letters of Support

Marcus K. Rogers PhD, CISSP, DFCP-Founder, CCCI-A
Professor/University Faculty Scholar
Fellow of CERIAS
Fellow American Academy of Forensic Sciences
765-560-3290
cyberforensics@mac.com

Thursday, January 26, 2012

John Sammons
Assistant Professor/Director, AIDE
Department Integrated Science and Technology
Marshall University One John Marshall Drive
Huntington, WV, 25755

Re: External Review of Undergraduate Curricula for FEPAC-Digital Forensics Accreditation

Please be advised that based on the gap analysis and review of the curriculum material provided relating to the undergraduate Major in Digital Forensics, it is my opinion that the program as presented, meets the standards as outlined in the American Academy of Forensic Sciences (AAFS) Forensic Science Education Programs Accreditation Commission (FEPAC) Accreditation Standards: Digital Forensics Document adopted February 20th, 2010.

It should be noted that the external review and expressed opinion do not constitute a formal accreditation review or endorsement by the AAFS.

You are to be congratulated on the hard work and diligence you have demonstrated in developing and modifying existing courses to create the new undergraduate program. I have no doubt that the program will deliver an excellent educational experience to the students and be a great benefit to the field of digital forensics.

Dr. Marcus K. Rogers

MRogers

rogersmk Digitally signed by rogersmk
DN: c=US, o=Apple Inc., ou=mac.com, cn=rogersmk, 2.5.4.13=Mobile Me iChat Encryption Certificate
Date: 2012.01.26 04:25:31 -05'00'

MARSHALL UNIVERSITY
www.marshall.edu

Forensic Science Graduate Program

January 24, 2012

Dr. Gayle L. Ormiston
Provost & Senior Vice President for Academic Affairs
Marshall University
One John Marshall Drive
Huntington, WV 25701

Dr. Ormiston,

I am writing in support of the undergraduate degree program in digital forensics proposed by Integrated Science and Technology (IST) within the College of Science. As the director of the Master's degree program in forensic science at Marshall University, I am well aware of the great need both at the national and international levels for college graduates who specialize in digital forensics. As was stated by US Secretary for the Department of Homeland Security, Janet Napolitano, during her keynote address at Marshall University last summer, federal agencies can hire every graduate in digital forensic and security curricula that universities can produce. I believe that IST has the foundation upon which to build a highly successful, accredited program in digital forensics. I have known John Sammons, an authority in digital forensics, when he was president of Second Creek Technologies and then in his capacity as a faculty member in IST. Mr. Sammons has the real-world expertise to develop a high quality program, which will attract large numbers of students to this exiting field of study. The Master's degree program at MUFSC is fully accredited through the Forensic Science Education Program Accreditation Commission (FEPAC), which will allow us to offer guidance to the undergraduate program as it seeks accreditation.

Currently, students enrolled in the graduate program and those from IST are interacting in digital forensic/security projects, including presentations to elementary and high school students focusing on being safe on social media sites. I look for these student interactions to only increase. Instructors from both programs have also provided continuing education to numerous stakeholders within the criminal justice system through presentations at professional meetings.

I look forward to continuing these interactions and fully support the undergraduate digital forensics offering through IST.

Sincerely

Terry W. Fenger

Terry W. Fenger
Director