University Curriculum Committee (UCC)

Chair: Alistair Welchman

Members: Karen Dodwell, Gregory Hazleton, Pepe Chang, Mark Giles, Martha Fasci, Wing Chung Ng, Turgay Korkmaz

Proposed Undergraduate Certificate in Pathogenic Outbreak Investigations

On August 7th, the UCC received from Lawrence Williams, Vice Provost, his recommendation of approval of a proposal for an undergraduate Certificate in Pathogenic Outbreak Investigations. The proposal originates from the Department of Information Systems and Cyber Security.

On August 11th, Senate Chair Karen Daas opened up comment on the proposal to the Faculty Senate as a whole.

The committee has considered the documentation provided, including the supplementary information on course content, and feedback from several faculty senators.

The Certificate was conceived initially as part of a federal grant proposal, indeed part of the justification for the certificate is that it is 'important to comply with the requirements of the ... grant award.' Members of the committee and faculty senators both noted that this raises some issues that merit general discussion and clarification. The worry is that the process of program approval has been circumvented or at least distorted, since rejection of the proposed program at this stage might violate the conditions of a federal grant. However, since it is not clear to the Committee exactly what the terms of the grant were, we cannot be sure.

As a result the UCC voted by a majority (5 in favor, 2 against, 1 abstention) to recommend that the Senate postpone consideration of the proposed Certificate on its substance and ask for (1) more information on the background to the proposed Certificate from the grant holders and the originating department (2) clarity about specific rules for seeking approval for programs where that approval is required for a grant.

Certificate in Pathogenic Outbreak Investigations

9-10-15 Faculty Senate Meeting

The senate decided to vote on the proposal, and address the procedural issues separately.

The result of the vote was:

- 32 approve
- 1 do not approve
- 3 abstentions

As a result, the certificate was passed by majority vote.

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August 6, 2015

MEMORANDUM

TO: Faculty Senate

FROM: Lawrence R. Williams 𝓛.𝓡.𝒲.
               Vice Provost and Dean of University College

SUBJECT: Proposal for an Undergraduate Certificate Program — Pathogenic Outbreak
               Investigations

Please review and consider for approval the attached proposal from the Department of
Information Systems and Cyber Security of the College of Business for a certificate program in
Pathogenic Outbreak Investigations.   The proposed undergraduate certificate program has
received the approvals of the Department of Information Systems and Cyber Security, the College
of Business Undergraduate Curriculum Committee, and the dean of the college.
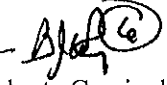
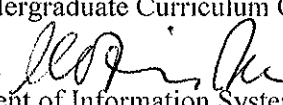I have reviewed the proposal and recommend it for approval.

MEMORANDUM

Date:	August 6, 2015
To:	Dr. Lawrence R. Williams Vice Provost and Dean of the University College
Through:	Dr. Bennie J. Wilson Chair, CoB Undergraduate Curriculum Committee / Faculty Forum
From:	Dr. Yoris A. Au Chair, Department of Information Systems & Cyber Security
Subject:	Clarification of Upper Division Courses Requirements for the proposed Undergraduate Certificate: Pathogenic Outbreak Investigations

The following information is provided to clarify the course numbers and upper division course requirements for the proposed certificate in Pathogenic Outbreak Investigations.

Courses required by all majors (6 Hours):

1. Introduction to Pathogenic Outbreak Investigations

Course description: A cross-disciplinary introduction to genetic and digital pathogens, their characteristics and methods for rapid analysis, geared toward predicting behavior during real-time outbreak investigations. The course examines both similarities and differences between biological and digital pathogens and presents core concepts from each domain to build a cohesive base for future multi-disciplinary research.

Cross-listed courses offered with each major designation (BIO, CS, IS/CyS); course numbers vary (3 credit hours). Course was offered in Spring 2015 and cross listed as IS 4953/BIO 4953/CS 4953.

2. Advanced Research in Pathogenic Outbreak Investigations

Course description: This course provides students with a supervised research experience with a project related to the analysis and/or defense of biological and/or digital threats. Students will learn formal research methodology, how to conduct literature reviews, how to synthesize their learning to formulate scientifically sound research questions and hypotheses, and how to choose an appropriate research design. Additional focal areas will include modeling and simulation tools for analyzing the spread of digital and biological pathogens, graph analytics, and biological sequencing analytics and alignment methods.

Cross-listed courses offered with each major designation (BIO, CS, IS/CyS); course numbers vary (3 credit hours). Course will be offered in Spring 2016 and will be cross listed as IS 4953/BIO 4953/CS 4953.

Course required according to major (3 hours):

1. Microbiology (BIO 3713) (3 hours; BIO students)

Course description: This course encompasses a comprehensive general study of microorganisms and their significance in disease. The syllabus spans bacteria, protozoa, fungi, algae, viruses, viroids, and prions. Objectives of the course are to provide the students with a general understanding of microbiology, as well as to prepare them for advanced studies in microbiology, biomedical research, and related disciplines.

2. Malware Agent Analysis (IS 4953) (3 hours; IS/CyS students)

Course description: This course encompasses a comprehensive study of the binary composition, functional attributes, and network-based characteristics of malware and botnet threats. The course will give students an overview of current hardware and software reverse engineering and botnet analysis concepts and technologies and their applications for network surveillance, outbreak investigation, and network and system risk assessment for actionable countermeasures to minimize adverse effects on critical infrastructures and computer networks. For better preparedness for disastrous outbreaks of malware and botnet threats, whether propagating by vulnerability exploitation opportunity or by deliberate cyber attacks, additional training in malware reverse engineering and analysis is needed to prepare future research professionals and cyber security professionals in the basic principles of software and hardware reverse engineering and analysis. Students will have the opportunity to learn about research advances in malware analysis, as well as apply advanced technologies for detection, analysis, surveillance, and risk assessment.

3. Cloud-oriented Big Data and Software Engineering (CS 4953) (3 hours; CS students)

Course description: This course consists of two major blocks. The first block introduces the basic concepts and knowledge of cloud-oriented software engineering, including service-oriented computing, run-time software architecture, dynamic code loading, software evolution at run-time, etc. We will also introduce the underlying programming language features and techniques such as reflection and just-in-time compilation. At the end of this block, we will discuss some recent research progress on major problems of cloud-oriented software engineering. The second block of the course encompasses a comprehensive study of the system architecture, enabling technologies, software environment, and innovative applications of Cloud Computing and Big Data Analytics. It will give students an overview of the open source Cloud Operating System (OpenStack), the de facto Big Data processing framework (Apache Hadoop), the MapReduce programming model, Spark framework and programming, and their application for bioinformatics, genome sequence analysis, and machine learning.

MEMORANDUM

Date: July 10, 2015

To: Dr. Lawrence R. Williams
             Vice Provost and Dean of University College

Through: Dr. Wm. Gerard Sanders
             Dean, College of Business

Through: Dr. Bennie J. Wilson
             Chair, CoB Undergraduate Curriculum Committee / Faculty Forum

From: Dr. Yoris A. Au
             Chair, Department of Information Systems & Cyber Security

Subject: Undergraduate Certificate: Pathogenic Outbreak Investigations

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Background & Justification:

In response to DHS Award Number 2014-ST-062-000058 from the Department of Homeland Security, entitled "2014 DHS Scientific Leadership Awards for Minority Serving Institutions Granting Bachelor Degrees – Analysis and Training for the Defense of Biological and Digital Threats," UTSA has established the DHS Scholars Program. As part of the program, undergraduate students are offered the opportunity to earn a Certificate in "Pathogenic Outbreak Investigations." DHS Scholars must complete the Certificate, although the Certificate is not limited to DHS Scholars.

The DHS Scholars Program is interdisciplinary, consisting of biology, computer science, and information systems / cyber security majors. Accordingly, the certificate is open to these majors, but is offered by the Information Systems & Cyber Security Department in the College of Business. The Certificate Program Advisor is the Department Chair or his/her official designee.

This certificate is important to comply with the requirements of the above stated grant award, but is also anticipated to be of interest to students focused on epidemiology or cyber security.

Courses:

As required by the UTSA undergraduate catalog, the certificate will consist of 15 credit hours (http://catalog.utsa.edu/undergraduate/certificateprograms/). The certificate consists of the following courses:

- Courses required by all majors (6 hours):
  - Introduction to Pathogenic Outbreak Investigations
    - Cross-listed courses offered with each major designation (BIO, CS, IS); course numbers vary (3 credit hours)

- o Advanced Research in Pathogenic Outbreak Investigations
    - ▪ Cross-listed courses offered with each major designation (BIO, CS, IS); course numbers vary (3 credit hours)
- Course required according to major (3 hours):
    - o Microbiology (3 hours; BIO students)
    - o Malware Agent Analysis (3 hours; IS/CyS students)
    - o Cloud-oriented Big Data and Software Engineering (3 hours; CS students)
- Elective options for each major (select 6 hours from the following, within student major):
    - o BIO student elective options*
        - ▪ BIO 3513 Biochemistry
        - ▪ BIO 3743 Bacteriology
        - ▪ BIO 4743 Immunology
        - ▪ BIO 5762 Fundamentals of Immunology for Biotechnology
        - ▪ BIO 6973 Special Problems: Comparative Genomics
        - ▪ BIO 6973 Special Problems: Microbial genomics
    - o IS / CyS student elective options
        - ▪ IS 3523 Intrusion Detection and Incident Response
        - ▪ IS 4483 Digital Forensic Analysis I
        - ▪ IS 4523 Digital Forensic Analysis II
        - ▪ IS 4463 Web Application Security
        - ▪ IS 4513 Cyber Physical Systems
    - o CS student elective options
        - ▪ CS 3753 Introduction to Data Science (being added to 2016-17 catalog)
        - ▪ CS 4223 Bioinformatics and Big Data (2015-17 catalog)
        - ▪ CS 4373 Introduction to Data Mining (2016-17 catalog)
        - ▪ CS 4973 Advanced Topics in Data Science (2016-17 catalog)
        - ▪ CS 4843 Distributed Computing and Systems (2016-17 catalog)
        - ▪ CS 4973 Advanced Topics in Systems and Cloud (2016-17 catalog)
        - ▪ CS 4353 Unix and Network Security
        - ▪ CS 4593 Secure Cloud

*Undergraduate biology students are permitted to take graduate courses based on need, student background/capability, and instructor consent.