Department of Mathematics, Computer Science, and Engineering

Proposal to create Dual-Admission Joint B.S. degrees in Computer Science and Information Security from the existing John Jay B.S. and LaGuardia Community College A.S Computer Science program

January 30, 2017

Effective date: articulation effective Spring 2017, joint degree Fall 2017 pending NYSED registration

Background and Process:

The Department Chair and the Curriculum Committee of the Department of Mathematics, Computer Science, and Engineering have approved this proposal to create a joint degree program by articulating the existing B.S. in Computer Science and Information Security at John Jay with the A.S. in Computer Science at LaGuardia Community College.

Since this joint degree program is being created from existing registered programs, a full degree proposal is not required. However, since all dual admission/joint degrees in New York State are created through governance at both the 2-year and the 4-year institution, John Jay College and each community college will bring this proposal through governance. In addition, the colleges must submit the NYSED "Change or Adapt a Registered Program" form and program schedule, indicating that they are "Creating a dual-degree program from existing registered programs."

Overview:

Cybersecurity represents an unusually broad, remarkably well-compensated set of new and emerging occupational areas, offering a surfeit of employment opportunities in New York City due to the severe shortage of qualified cyber-workers. These occupations rank among the fastest growing professional employment opportunities in NYC.[1] The NYC Department of Labor estimates overall growth in cyber-allied fields at over 20% by 2020, with higher projections for selected categories (36.5%), and with near astronomical growth rates anticipated (58.6%) for the most highly skilled by 2022.[2] This explosive growth places New York City second nationally—just behind Washington, D.C.—for cybersecurity employment opportunities.[3]

The field offers remarkable earning opportunities for successful college graduates. Entry-level positions in the cybersecurity fields are unusually well-paid, with private sector career entrants earning roughly $60,000 to start, a figure can that double within the first two-years of employment. The number of those entering the cybersecurity occupations, however, has lagged severely behind the number of openings, causing a critical gap in the public and private sectors' security defense and severe shortages of cyber-workers in specific industries, including financial services, healthcare and retail trade--among the largest industries in the NYC economy. Private sector New York employers point to the problem of inappropriately prepared applicants who lack rudimentary familiarity with the professional work world. They also underscore the dearth of knowledgeable and skills-qualified career entrants, which causes long-term job vacancies, limits the productivity of newly hired cybersecurity professionals, and stunts economic growth

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[1] According to the U.S. Bureau of Labor Statistics, growth in information security jobs is projected at 37% from 2012–2022, a rate two and one-half times faster than the average for all occupations: http://www.bls.gov/ooh/computer-and-information-technology/information-security-analysts.htm.

[2] See http://www.labor.ny.gov/stats/lsproj.shtm for 2012-2022 growth projections and http://burning-glass.com/wp-content/uploads/Cybersecurity_Jobs_Report_2015.pdf for industry-specific cybersecurity employment increases over the last 5 years. Cybersecurity workers earn 2-3 times more than the national average for similarly educated employees.

[3] http://www.washingtonpost.com/news/capital-business/wp/2014/03/05/evidence-that-the-d-c-area-really-is-a-hotbed-for-

as the incidence and costs of cybercrime mushroom and place at grave financial risk both businesses and the public.

Borough of Manhattan Community College, Bronx Community College, Kingsborough Community College, LaGuardia Community College, and John Jay College of Criminal Justice propose a dual admission/joint degree program (A.S. / B.S.) in Computer Science and Information Security that will help address this shortage. In addition, the planned degree aims to:

1) improve student academic success at the community and senior colleges;
2) increase the rate of transfer from the associate degree to the bachelor's degree;
3) bolster opportunities for students' career entry and success in the cyber security and tech fields, and
4) ensure curricular alignment between the colleges and the needs of cybersecurity and tech employers.

The aforementioned Community Colleges and John Jay will launch this collaborative program by building on their successful track-record in the CUNY Justice Academy. The CUNY Justice Academy (CJA) is a unique educational partnership connecting John Jay College of Criminal Justice to CUNY's six traditional community colleges. This program currently provides academic pathways leading from associate degree study to a bachelor's degree and ultimately to exciting careers in the fields of Criminal Justice, Forensic Science and Forensic Financial Analysis. Assessment shows that CJA programs have led to an unprecedented transfer rate of associate degree students from the participating community colleges to John Jay College when compared to the rate of non-CJA transfers. The programs of the CJA have also positively and significantly impacted student G.P.A.s, rates of credit accumulation and time to degree completion. We anticipate that students who enroll in the proposed dual admission/joint degree program Computer Science and Information Security will benefit similarly.

The new degree program will benefit from a workforce development partnership with the Cybersecurity Workforce Alliance (CWA) – an association of private sector employers, technology innovators, and educators, including the Federal Reserve Bank of NY, Fidelity Bank, Bank of NY Mellon, J.P. Morgan Chase, Morgan Stanley, Goldman Sachs, SIFMA, Express Scripts, RANE, iQ4, and Capgemini, among others-- formed to increase and improve the cybersecurity workforce-- and numerous public sector cybersecurity employers. The curriculum is also consistent with the framework of the National Institute for Standards and Technology's (NIST) National Initiative for Cybersecurity Education (NICE), which will increase our graduates' marketability.

Internship and other experiential learning opportunities developed by the participating colleges and also by external partners will further prepare students for the workforce. The degree program also will make use of new and emerging technologies to optimally ready students[4] for cybersecurity careers, thereby expanding employment opportunities for the city's lower income college students by providing them with openings to highly paid jobs in the private sector that have been previously unavailable to them.

Participating Degree Programs:

From	To
LaGuardia Community College A.S. in Computer Science Program Code: 82352	John Jay College B.S. in Computer Science and Information Security Program Code: 88202

[4] John Jay students are among the poorest of senior college students at CUNY according to the most recent IPEDS' Pell eligibility reporting data. CJA community college students rank in the bottom half of all CUNY college students, with one exception, using the same criterion.

Curriculum:

Joint B.S. Degree with LaGuardia Community College — 57-63 Cr.

Prerequisites (May be waived depending on Math Placement) — **0-7 Cr.**
MAT 115 College Algebra and Trigonometry (at LAGCC MAT 117 Algebra & Trigonometry, may be substitute for MAT 115 depending on placement; MAT 105 College Algebra)
MAT 200 PreCalculus (at LAGCC, for MAT 141 PreCalculus)[1]

Part One. Core Computer Science Courses — **33 Cr**
Required
MAC 125 Advanced C/C++ Programming (at LAGCC, for CSCI 271 Introduction to Computing and Programming)
MAC 190 Object Oriented Programming (at LAGCC, for CSCI 272 Object-Oriented Programming)
MAC 283 Computer Organiz & Assembly Lang (at LAGCC, for CSCI 274 Computer Architecture)
CSCI 360 Cryptography and Cryptanalysis
MAC 286 Data Structures (at LAGCC, for CSCI 373 Advanced Data Structures)
CSCI 374 Programming Languages
CSCI 375 Operating Systems
CSCI 377 Computer Algorithms
CSCI 379 Computer Networking
CSCI 411 Computer Security and Forensics
CSCI 412 Network Security & Forensics

Part Two. Required Math Courses — **9 Cr.**
Required
MAC 281 Discrete Structures (at LAGCC, for MAT 204 Discrete Structures)
MAT 201 Calculus[1] (at LAGCC, for MAT 241 Calculus I)
MAT 301 Probability and Mathematical Statistics I

Part Three. Electives — **6 Cr.**
Category A. Computer Science Electives
Select one
CSCI 362 Databases and Data Mining
CSCI 376 Artificial Intelligence
CSCI 380 Selected Topics in Computer Science
CSCI 404 Internship in Management Information Systems

Category B. Mathematics Electives
MAT 210 Linear Algebra (at LAGCC, for MAT 310 Linear Algebra)

Part Four. Ethics — **3 Cr.**
Required
PHI 392 Ethics and Information Technology

Part Five. Capstone Courses — **6 Cr.**
Required
CSCI 400 Capstone Experience in Digital Forensics/Cybersecurity I

CSCI 401 Capstone Experience in Digital Forensics/Cybersecurity II
Additional requirements for LAGCC A.S. degree:
MAT 202 Calculus II, MAC 101 Intro to Computer Science

Notes:

1. Courses granting four credits at LAGCC will fulfill the corresponding three credit John Jay Computer Science Major requirement, plus one elective credit.

Distribution of Coursework between LAGCC and JJC

Prerequisites (May be waived depending on Math Placement)

At LAGCC (0-7 Credits)	At JJC (0 Credits)
MAT 115 College Algebra & Trigonometry (or MAT117 Algebra & Trigonometry, depending on placement)	
MAT 200 PreCalculus[1]	

Part One. Core Computer Science Courses **33 Cr**

Required

At LAGCC (12 Credits)	At JJC (21 Credits)
MAC 125 Advanced C/C++ Programming	CSCI 360 Cryptography and Cryptanalysis
MAC 190 Object Oriented Programming	CSCI 374 Programming Languages
MAC 283 Computer Organiz & Assembly Lang	CSCI 375 Operating Systems
MAC 286 Data Structures	CSCI 377 Computer Algorithms
	CSCI 379 Computer Networking
	CSCI 411 Computer Security & Forensics
	CSCI 412 Network Security & Forensics

Part Two. Required Math Courses **9 Cr.**

Required

At LAGCC (6 Credits)	At JJC (3 Credits)
MAC 281 Discrete Structures	MAT 301 Probability and Mathematical Statistics I
MAT 201 Calculus I[1]	

Part Three. Electives **6 Cr.**

At LAGCC (3 Credits)	At JJC (3 Credits)
MAT 210 Linear Algebra	Select one CSCI 362 Databases and Data Mining CSCI 376 Artificial Intelligence CSCI 380 Selected Topics in Computer Science CSCI 404 Internship in Management Information Systems

Part Four. Ethics **3 Cr.**

Required

At LAGCC (0 Credits)	At JJC (3 Credits)
	PHI 392 Ethics and Information Technology

Part Five. Capstone Courses **6 Cr.**

Required

At LAGCC (0 Credits)	At JJC (6 Credits)
	CSCI 400 Capstone Experience in Digital Forensics/Cybersecurity I
	CSCI 401 Capstone Experience in Digital Forensics/ Cybersecurity II

Total Credits

At LAGCC: 21-24 Credits	At JJC: 36 Credits

MAT 202 Calculus II, MAC 101 Intro to Computer Science

*Courses listed as "additional requirements for the AS degree" are required at the discretion of a community college partner's AS degree program. Seven credits earned in these two courses will fully count as electives towards the 120 credits required for the B.S. degree at John Jay.

Notes:

1. Courses granting four credits at LAGCC will fulfill the corresponding three credit John Jay Computer Science Major requirement, plus one elective credit.

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LaGuardia Community College

Dr. Michael Baston Date
Acting Provost and Vice President for Academic Affairs & Student Affairs

Dr. Abderrazak Belkharraz Date
Chairperson, Department of Mathematics, Engineering, & Computer Science

John Jay College of Criminal Justice

Dr. Jane Bowers Date
Provost and Senior Vice President for Academic Affairs

Dr. Douglas Salane Date
Chairperson, Department of Mathematics and Computer Science

Part Five. Capstone Courses **6 Cr.**

Required

At LAGCC (0 Credits)	At JJC (6 Credits)
	CSCI 400 Capstone Experience in Digital Forensics/Cybersecurity I
	CSCI 401 Capstone Experience in Digital Forensics/ Cybersecurity II

Total Credits

At LAGCC: 21-24 Credits	At JJC: 36 Credits

MAT 202 Calculus II, MAC 101 Intro to Computer Science

*Courses listed as "additional requirements for the AS degree" are required at the discretion of a community college partner's AS degree program. Seven credits earned in these two courses will fully count as electives towards the 120 credits required for the B.S. degree at John Jay.

Notes:

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LaGuardia Community College

2/1/17

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Acting Provost and Vice President for Academic Affairs & Student Affairs

2/6/17

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Chairperson, Department of Mathematics, Engineering, & Computer Science

John Jay College of Criminal Justice

1/31/17

Dr. Jane Bowers Date
Provost and Senior Vice President for Academic Affairs

1/30/17

Dr. Douglas Salane Date
Chairperson, Department of Mathematics and Computer Science