UNIVERSITY OF THE DISTRICT OF COLUMBIA

COLLEGE OF ENGINEERING & APPLIED SCIENCE

DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

CURRICULUM PROPOSAL: REVIEW OF EXISTING PROGRAM

SUBMITTED BY

DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

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WASHINGTON, DC

Proposal for an

Accelerated Bachelor/Master Program in Computer Science

University of the District of Columbia

College of Engineering and Applied Sciences

November 2012

UNIVERSITY OF THE DISTRICT OF COLUMBIA

UNIVERSITY SENATE
ACADEMIC PROGRAMS/COURSES
TRANSMITTAL FORM

TYPE OF REVIEW REQUESTED _____review of existing program_____

INITIATED BY (name, program/dept, college/school)
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Accelerated Bachelor-to-Master Program   in Computer Science

1.   Summary of Proposed Program

The Department of Computer Science proposes the establishment of an **accelerated path** between its **existing** Bachelor's degree programs and its **existing** Master's degree program. The Accelerated Bachelors/Master's (ABM) program will enable a UDC BSCS student to take up to fifteen MSCS credits prior to admission to the MSCS program. Up to twelve of these graduate-level credits may be double counted towards both the bachelor's and master's degree requirements. The other three graduate-level credits may be applied toward the master's degree if and only if these credits were not used to fulfill the requirements of the bachelor's degree. This program enables our BSCS students to complete the requirements for both the bachelor's and master's degrees at an accelerated pace. The accelerated program will encourage undergraduate students to make an early commitment to graduate studies, increase enrollment and thus enhance the graduate program. Similar programs currently exist in many other institutions in the nation including the University of Maryland (college park), George Washington University, and George Mason University. A list of some of these institutions and links to their programs are given in Appendix A. <u>Eight of the of twenty-six institutions/programs listed offer maximum of 9 credits double-counting, while three of them offer 12 credits double-counting. All of these three programs with maximum of 12 credits double counting are computing science or computing engineering programs.</u>

Description of the Program

To encourage undergraduate students to make an early commitment to graduate studies, increase enrollment and enhance the graduate program, we propose an Accelerated Bachelors/Master's (ABM) program path between **existing** BSCS/IT programs and **existing** MSCS program.

The ABM program is intended for highly motivated and qualified undergraduate students who wish to pursue an advanced degree. Undergraduate students admitted to the ABM program may take up to 15 graduate-level credits (five MSCS core or elective course) prior to admission to the Master's program. Twelve of these graduate-level credits may be double counted towards both the bachelor's and master's degree requirements. These twelve credits must be used to fulfill the technical elective requirements of the bachelor's degree. The other three graduate-level credits may be applied toward the master's degree if and only if these credits were not used to fulfill the

requirements of the bachelor's degree. Double-counted credits must be from the list of seven MSCS core courses. For each of the graduate courses, a minimum grade of "B" is required.

The implementation of the ABM programs can provide qualified students with the following benefits and opportunities:

- Finish an MSCS degree faster in addition to obtaining a BS degree.
- Integrate undergraduate and graduate study at an early stage and thus improve the overall learning experience.

The implementation of the ABM program can help attract more students to the undergraduate program and increase the pool of qualified students from which graduate programs can recruit. Increasing the number of students in both the undergraduate and graduate programs will help improve resource utilization and reduce the costs of teaching and research per student in the department.

A. Admission to the ABM Program

Interested undergraduate student of CSIT department can opt to take the ABM program path as early as the first semester in his/her junior year. To take the ABM program path, students must meet the following criteria:

- A cumulative GPA of 3.2 or higher
- Completed Computer Science II and received B or above

A student shall apply for the ABM program by submitting his/her adviser a signed copy of the application form, accompanied by i) a copy of his/her UDC transcript; ii) three letters of reference. The adviser will decide whether to recommend this student or not and sign on the application form accordingly. The form signed both the student and the adviser shall be submitted to the Graduate Program Director for signature of approval. A student is officially accepted into the ABM program if and only if the application is approved by both the adviser and the Graduate Program director. A new adviser will be assigned to the student, if the current adviser is not a graduate faculty member. Being informed the admission to the program, the student shall meet with his/her adviser to plan for courses to take the following semester(s).

Both BSCS students and BSIT students can apply for the ABM program in CS. For BSCI students, necessary background courses for MSCS program shall be taken, prior to taking MSCS core and elective courses. These background courses are the following. They will not be counted toward MSCS degree, nor to the Bachelor's degree in IT.

- MATH 213 Discrete Mathematics
- CSCI 412 Operating Systems
- CSCI 241 Data Structures

During the ABM program, the student is still registered as an undergraduate student until he/she receives bachelor's degree, or until he/she has taken the maximum fifteen MSCS credits.

B. Taking MSCS credits in the ABM in Computer Science

While registered as an undergraduate student, an ABM student in Computer Science can take up to twelve credits come from the following list of core courses of current MSCS program. After taking twelve credits, he/she can take three more credits from 500 level electives. No more than nine MSCS core and/or elective credits shall be taken during a given semester.

> CSCI 504 Algorithm Design and Analysis
> CSCI 505 Foundations of Computer Architecture
> CSCI 506 Principles of Operating Systems
> CSCI 507 Principles of Database Systems
> CSCI 508 Principles of Data Communication Networks
> CSCI 509 Foundations of Software Engineering
> CSCI 510 Principles of Artificial Intelligence

C. Maintaining status in ABM in Computer Science

The student must maintain a GPA of at least 3.2 over all undergraduate courses taken, and a GPA of at least 3.0 in all graduate courses taken in order to remain in good standing in the program. If a student's GPA drops below 3.2, the student will be placed on academic probation within the program for one semester. If the student raises their GPA to 3.2 or higher, he or she will be removed from probation and returned to good status to the program. If after one semester the student is not able to raise their GPA sufficiently, she/he will be removed from the ABM program.

D. Opt-Out Option

A student may withdraw at any time from the ABM program, by informing the Advisor and Graduate Program Director in writing. A student who either desires to withdraw or is denied continuation in the ABM program will nonetheless be able to complete the traditional BS program. In that case, the graduate courses taken can still count toward BS degree, if applicable. The graduate course credits used for the undergraduate degree cannot be used toward a graduate degree in the future.

E. Seeking MSCS degree

Students who are admitted to the ABM in Computer Science will NOT need to undergo the standard MSCS application process.

When a ABM student receives his/her bachelor's degree, or have reached the maximum of fifteen MSCS credits, They shall request to change their status to graduate student, by submitting the standard university Change of Major Form to his/her adviser for approval.

An ABM student is required to take the following writing course:

ENGL-515 Writing Proficiency

This requirement can be waived if the student takes the GRE exam and achieve score of 4.0 or above in the writing section.

The credits for the Writing Proficiency course will not count toward the MSCS degree.

F. Apply credits to MSCS Degree

After enrolled as a graduate student, an ABM student should initiate a credit transfer to the MSCS program. The student should fill out an ABM credit transfer from and submit it to the Graduate Program Director. In the form, the follow information is required: student N-number, full name, courses number and title of the credits to be transferred, time that these courses were taken, the grades. The Graduate Program Director will review and sign for approval. The student should then take the form to the Department Chair and Dean for signature of approval. After that, the student can take it to the registrar's office for credit transfer. Tuition difference between undergraduate and graduate credits may need to be paid prior to the credit transfer, following university regulations. The registrar's office will verify if and how many the credits requested to be transferred have been applied to the undergraduate degree and make proper transfer according to the guideline in this proposal.

Justification and Need

Need: The U.S has been the leader in engineering science and technology since the World War II. However, such dominant position is now being challenged by other nations. In recent years, China and India continue to graduate more engineers than the U.S., thus reducing the number of talented foreign students studying in the U.S. As a result it is imperative to attract more domestic students to engineering programs, especially at the graduate level since the percentage of the domestic (U.S. citizens) engineering graduate students is very low. One of the reasons is because most domestic undergraduate students in engineering do not continue to pursue advanced graduate engineering degree after graduation due to their job opportunities. The proposed ABM programs provide a strong incentive to those high quality undergraduates to complete both degrees in relatively shorter time period.

There is ever-growing number of universities throughout the United States offering similar programs in a wide variety of STEM disciplines. Examples of such universities include the University of Maryland at College Park, George Mason University, Georgia Institute of Technology, Old Dominion University, University of Tennessee at Knoxville, North Carolina

State University, Ohio State University, and Drexel University. For many universities, the availability of accelerated programs is used as a marketing tool to attract larger number of applicants to their undergraduate programs. Many Computer Science departments offering such a program double count 6 – 12 credit hours towards the requirement of both the BS and MS degrees. A list of some of these institutions and a link to their programs is given in Appendix A. **Eight of the of twenty-six institutions/programs listed offer maximum of 9 credits double-counting, while three of them offer 12 credits double-counting. All of these three programs with maximum of 12 credits double counting are computing science or computing engineering programs.** For UDC to compete, in recruiting talented students, with these universities above, we need to implement the proposed ABM in Computer Science.

Justifications: Even though we allow maximum of 12 credits of double counting, all the double-counting credits must be chosen from the seven core courses of MSCS, each of which has its counterpart in undergraduate curriculum. The following scenario illustrates that the double counting will not jeopardize the quality of our degrees,

- Undergraduate Student A took undergraduate 400-level Operating Systems. When later become MSCS student, he took 500-level Principle of Operating Systems and passed.

- Undergraduate Student B started Accelerated Program, and took the 500-level Principle of OS directly while being an undergraduate student. She also passed it according to graduate student standard.

There are no difference of the above two paths in terms of achieving learning outcomes. Student B saved time by not having to take the overlapping part of the lectures for twice. And this is where the acceleration comes from. It will NOT dilute the MSCS degree, nor BSCS/IT degree, by any means.

Successful implementation of the ABM program can help attract more students to the undergraduate program and increase the pool of qualified students for MSCS program. Successful implementation of the proposed ABM program can provide a model example for other departments at UDC.

Congruence with University Mission

UDC has a strong commitment to teaching and research. The published UDC mission statement regarding its academic programs states, "… These programs will prepare students for immediate entry into the workforce, for the next level of education, for specialized employment opportunities, and for lifelong learning." Consistent with this mission, the proposed program will provide students with additional depth and breadth beyond the bachelor's degree and the opportunity to do supervised research and to receive two degrees in a shorter time than it would take to pursue the degree separately. Students who complete the program will have higher

credentials and be able to contribute more quickly and effectively to their employer's mission. Such an innovative program is important for attracting students to graduate studies, especially from the DC metropolitan area.

Avoidance of Duplication or Overlap with Other Programs

The proposed ABM will not duplicate any existing program at the University of the District of Columbia.

Relationship with Other Programs/Department

The proposed ABM program will complement and help strengthen the current MSCS program. It will also complement and help strengthen the undergraduate programs of CSIT department.

Effect of Student/ University Development

Recent advances in the engineering profession require successful engineers to have additional breadth and depth beyond the bachelor's degree. Many employers are favoring applicants with the additional education and experience implied by the Master's degree. In many STEM disciplines, The Master's degree is slowly becoming the entry level degree into the profession. The ABM program seamlessly followed by a Master's degree program will help reduce the cost of both degrees and enhance student marketability for career advancement. Computer science graduates who have completed the MS degree generally enter the work force with higher starting salaries and a wider range of career opportunities from which to choose. They also tend to be promoted sooner than those who have not completed graduate level degrees.

Graduate students are the main workforce in research activities. Increasing the number of students admitted to the AMB and the MS programs will help enhance the quality of the research conducted by the faculty. This is essential to apply for research grants from sources such as the National Science Foundation (NSF), The Department of Education (DOE), the Department of Defense (DoD) to list a few.

Adequacy and Qualifications of Current Faculty and Support Staff

No additional faculty is requested to support this proposal.

Projected Enrollment

Initially, this proposal can help increase the number of graduate students enrolled in the MSCS program by at least 2-5 per year. In addition, the availability of the ABM may help attract more students to the BSCS program, thus increase the number of undergraduate students eligible to enroll in this program. It is anticipated that the ABM will help increase the number of students enrolled in MSCS by at least 5 students per year within five years.

Adequacy of Current Facilities, Supplies, and Equipment

The proposed program will not require additional space for its facilities. However, more office, teaching, and research supplies may be needed in proportion to enrollment increase.

Estimated Costs, Available Funds, and Probable Funding Sources

Therefore, there is no personnel cost associated with this proposal, even though, office, teaching and research supplies may be needed for the increased enrollment. The cost of teach and research supplies can come from tuition and fees, which will come in proportion with the enrollment.

Adequacy of Supportive library and Technical Staff

UDC has adequate library support and technical staff. Subscription to the Institute of Electrical and Electrical Engineering (IEEE) digital library (IEEE Xplore) and the Association of Computing machinery (ACM) digital library provide access to the state-of-the art research activities and development in the computer science field. Currently Two technical staff members of School of Engineering and Applied Sciences are dedicated to lab maintenance.

Appendix A: A Selective List of Institution with program similar to the proposed ABM program

No.	Academic Institution	Academic Institution Web Site Link	Double Counted Credits (Max)
1	The University of Maryland (College Park)	http://www.ece.umd.edu/Academic/Grad/BS_MS/index.php	9
2	George Mason	http://catalog.gmu.edu/preview_program.php?catoid=15&poid=5736&returnto=1031	6
3	Georgia Tech.	http://www.ece.gatech.edu/internal/students/bsms_prog/index.html	6
4	The University of Tennessee (Knoxville)	http://catalog.utk.edu/preview_program.php?catoid=5&poid=1586	6
5	North Carolina State University	https://www.ece.ncsu.edu/undergraduate/abm	12 Electrical and Computer Engineering
6	University of Maryland, Baltimore County	http://www.cs.umbc.edu/portal/ComputerEngineering/cmpe_ugrad/main/links.shtml	9
7	Old Dominion University	http://eng.odu.edu/ece/academics/grad/programs/bs_ms_prog.shtml	6
8	Purdue University, Indianapolis	http://www.engr.iupui.edu/ece/bs_special.shtml?menu=bs	select upper level electives
9	The Ohio State Univ.	http://ece.osu.edu/futurestudents/graduate/bsms	9
10	University of Massachusetts, Dartmouth	http://www1.umassd.edu/engineering/ece/graduate/bsms.cfm	9
11	Columbia University	http://www.ee.columbia.edu/pages/academics/IntergratedBS_MSProgram/index.html	6

12	Drexel University	http://www.ece.drexel.edu/dual_degree.html	Zero. However, reduces the requirement for BS from 192 to 180 credits.
13	Case Western Reserve	http://engineering.case.edu/current-students/academic-programs/bs-ms	9
14	Worcester Polytechnic Institute.	http://www.wpi.edu/academics/ece/bsms-programs.html	12 Electrical and Computer Engineering
15	Washington University, Saint Louis	http://ese.wustl.edu/undergraduateprograms/Pages/bs-ms.aspx	6
16	Villanova University	http://www1.villanova.edu/villanova/engineering/departments/electrical/undergrad/5year.html	9
17	Florida International University	http://www.cec.fiu.edu/academics/accelerated-bsms/bsms-computer-engineering/	6
18	Iowa State University	http://www.ece.iastate.edu/academics/concurrent-degree-programs/	6
19	University of Colorado at Boulder	http://ecee.colorado.edu/academics/grad/BS_MS.html	6
20	Colorado School of Mines	http://gradschool.mines.edu/Combined	6
21	University of Florida	http://www.cise.ufl.edu/academics/undergrad/bsms/	12 Computer and Information Science and Engineering

22	Florida Atlantic University	http://www.ceecs.fau.edu/computer-engineering/5-year-joint-bsms-degree-program	9
23	Texas Tech University	http://www.depts.ttu.edu/ece/testing/grad/bsms/	9
24	George Washington University	http://www.seas.gwu.edu/ece/prospective/undergraduate/documents/5-Year%20BS%20MS%20Program.pdf	6
25	Binghamton University, NY	http://www.binghamton.edu/ece/grad/accelerated-degree-programs.html	6
26	New Mexico State University	http://www.ece.nmsu.edu/BS_MS_Program.htm	6