PROPOSED PROGRAM SUMMARY

Instituion: University of Louisville
Program Name: Computer Science
Degree Designation: BACHELOR OF ARTS (BA)
Degree Level : Baccalaureate

Program Description

The proposed Bachelor of Arts (BA) in Computer Science (CS) degree is in response to the existing need for technical jobs throughout the industry in Louisville and Kentucky as a whole. The structure of the program offers the students a chance not only to become well-equipped computer scientists but also to excel in other areas of studies that will match the students' interests. It will fulfill the demand in careers that rely on computer science and broad knowledge in application areas. The program is designed to be eight semesters long with two co-ops (or internships) in between. The credit hours of the program cover the required thirty-one credit general education requirements, two hours earned from the co-ops (internships), a minimum of fifty-seven hours in the field of computer science and an additional minimum of thirty hours in other areas of study (excluding business). Allowing students to choose other areas of studies that are not necessarily tied to sciences or engineering will make this degree attractive to students with leanings towards fields in liberal arts and the desire to work in a technically savvy industry. This degree should attract students directly from high schools, pre-engineering students, transfer students, and existing graduates with skills in other disciplines and a desire for a future in a technical career. The program is also designed to leverage the expertise and infrastructure in existence in the Department of Computer Science and Engineering (CSE).

Will this program replace or enhance any existing programs(s) or tracks, concentrations, or specializations within an existing program? If yes, please specify
No.

CIP Code: 11.0701
Credit Hours: 120
Institutional Board Approval Date: 4/22/2021
Implementation Date: 8/23/2021

Student Demand

Year 1 - 40
Year 2 - 92
Year 3 - 146
Year 4 - 202
Year 5 - 229

Market Demand

Computer Science is changing every part of our lives, and it is not surprising that it is the number one source of all new wages in the U.S. economy. According to the U.S. Bureau of Labor Statistics, computing occupations constitute 58% of all projected new jobs in STEM fields based on their 2016-2026 employment projections, and currently there are more than 500,000 open computing jobs in the U.S. (Source: http://bit.ly/38OMyHK). This shortage is clearly reflected in H1B visa statistics as well, where 59% of H1B "skilled worker" visas were granted for computer science occupations in 2014, according to the U.S. Department of Labor, Office of Foreign Labor Certification (Source: http://bit.ly/2EmDonY).

In addition to the national shortage in a computing workforce, the local industry in Louisville also suffers from a tech shortage, based on a recent article published in Louisville Business First journal, the leading source for business news, data and networking for the Greater Louisville area (For more information, see: https://www.bizjournals.com/louisville/). In their June 28, 2019 article, editor David A. Mann interviewed local leading companies in the Louisville area to find out what they are doing to meet their tech needs in the Louisville region. The editor found out that according to KentuckianaWorks, a local workforce development company, there are about 2,750 tech job postings in Louisville, and the tech sector itself needs the most workers. In addition, Norton Healthcare Inc. stated in this interview that they need a major workforce in Louisville to develop apps and clinical technology, as well as maintain electronic medical records; however, the pool of resources within this region is shallow. GE Appliances, Kindred Healthcare LLC, Humana Inc., and Interapt LLC are among other Louisville-based companies who shared a similar view regarding the shortage in local tech talent. For more information and details, the full article can be accessed at: http://bit.ly/34udEke.

Unlike technical companies such as Google and Microsoft, which focus on the computing technology itself, many computer science related jobs in Louisville and elsewhere require the application of computer science skills into different fields. The proposed BACS program will fill this important void by providing students the opportunity to learn both computer science and another area of study where computer science has significant application. Compared to the current BS CSE program that focuses on the engineering and science application of computer science, the proposed BACS program targets the application of computer science in areas other than engineering and sciences, which are abundant in Louisville and elsewhere. In addition, the BACS program is expected to attract students from underrepresented groups, thus potentially increase the diversity in high-tech workforce in Louisville and beyond.

The proposed BACS program does not replace another program on campus.

Employment Demand

	Regional	State	National
Type Of Job	**Computer Network Architects**		
Avg. Wage	$83,282	$75,928	$109,020
# Jobs (Postings)	445	1265	12200
Expected Growth	11%	12%	5%
Type Of Job	**Computer Network Support Specialists**		

Avg. Wage	$58,016	$56,779	$62,770
# Jobs (Postings)	689	1354	17400
Expected Growth	10%	17%	6%
Type Of Job	**Computer Occupations, All Other**		
Avg. Wage	$77,329	$80,231	$90,270
# Jobs (Postings)	1333	2157	35700
Expected Growth	11%	11%	10%
Type Of Job	**Computer Systems Analysts**		
Avg. Wage	$73,904	$75,381	$88,740
# Jobs (Postings)	1693	3248	53400
Expected Growth	10%	11%	9%
Type Of Job	**Computer User Support Specialists**		
Avg. Wage	$44,496	$46,986	$50,980
# Jobs (Postings)	2440	4961	65100
Expected Growth	9%	16%	11%
Type Of Job	**Database Administrators**		
Avg. Wage	$85,970	$72,282	$90,070
# Jobs (Postings)	439	936	9700
Expected Growth	8%	15%	90%
Type Of Job	**Network and Computer Systems Administrators**		
Avg. Wage	$66,863	$63,644	$82,050
# Jobs (Postings)	941	2335	29300
Expected Growth	9%	7%	5%
Type Of Job	**Software Developers, Applications**		
Avg. Wage	$81,851	$80,322	$103,620
# Jobs (Postings)	3650	5567	99200
Expected Growth	23%	33%	26%
Type Of Job	**Software Developers, Systems Software**		
Avg. Wage	$86,020	$86,915	$110,000

# Jobs (Postings)	999	1835	35400
Expected Growth	15%	22%	10%
Type Of Job	**Web Developers**		
Avg. Wage	$69,431	$58,095	$69,430
# Jobs (Postings)	511	1218	15100
Expected Growth	10%	18%	13%

Indicate source of market demand information

Source (Regional - Louisville): KentuckianaWorks, Occupational Outlook for the Louisville Region, August 2019. (Time Frame: 2019-2029)
Source (State): Education and Workforce Development Cabinet, Kentucky Occupational Outlook to 2026, September 2018. (Time Frame: 2016-2026)
Source (National): Bureau of Labor Statistics, Employment Projections, Table 1.7. (Time Frame: 2018-2028)

Academic Demand

This is a program designed for students to enter the workforce directly after graduation. However, graduates from the BACS program will also be able to apply for graduate programs in the CSE Department such as the MS in CS, the graduate certificate in data science, and the graduate certificate in cybersecurity, as well as graduate computer science programs at other institutions. In addition, BACS graduates can apply for interdisciplinary programs that integrate computer science with another area of study.

Unneccessary Duplication

Similar Program(s):

Program Id	Inst code	Inst Description	Degree Designation	Program Title	Report year
2242	00197700	Murray State University	BA;BS	Computer Science	2015
11814	00197700	Murray State University	BS	Computer Science	

Comparison of Objectives/Focus/Curriculum to Similar Programs:
Murray State's Bachelor of Science degree in Computer Science is the only state program returned in our search by CIP from the CPE website. Murray State's computer science program is a Bachelor of Science degree program, which emphasizes scientific computing and problem solving. By comparison, the proposed BACS is a Bachelor of Art program, which emphasizes the computer science applications in areas other than science and engineering. Thus, the BACS program will provide students flexibility to study another area where computer science can be applied to. Also, the BACS program requires two co-ops (or interns) so that students can develop and improve their professional skills in applying computer science to solve real-life problems in the industrial setting.

Comparison of Student Populations:
Murray State's CS program targets students who are interested in scientific computing, which is similar to our current BS CSE program, which target the computing applications in both science and engineering. The BACS program, by comparison, targets students with interests in learning both compute science and other areas such as liberal arts.

Access to Existing Programs:
There is a documented shortage of tech workforce in Louisville and Kentucky, and our current BS CSE program cannot meet current student demand and graduate enough students in this area. There are about 200 pre-engineering students at UofL, as well as other students who like to study computer science but are not interested in a traditional engineering program with much emphasis on advanced math, science and engineering courses. The BACS program will provide opportunities for these students to study computer science and its applications. Also, as an urban university in the city of Louisville, UofL is uniquely positioned to attract populations who are financially unable to study at locations other than Louisville or who prefer to have co-op experiences that may not be available in other universities.

Feedback from Other Institutions:
The computer science cores are similar but with some differences as follows. The BACS program of UofL offers both C programming and object-oriented programming such as C++ and Java, while Murray State's curriculum focuses on C++ and other object-oriented programming. The BACS program teaches CSE 420 Design of Operating Systems, which is not in the Murray State's curriculum. The BACS program includes 6 CSE electives, which can be selected from a long list of computer science technical elective courses with breadth and depth that can leverage UofL School of Engineering's research strength and the integrated research and teaching in current and advanced topics in computer science.

Cost
  Projected Revenue over Next Five Years ($) : 2947578
  Projected Expenses over Next Five Years ($) : 2193937

Will Additional faculty be needed? Yes
The BACS students will take many of the same General Education and Computer Science courses as our current BS CSE students, and we expect that the increase of 40 BACS students estimated for the first year can be accommodated in those shared courses. However, for computer science courses that have lab sessions or are programming-intensive, we request 1 additional graduate teaching assistant (GTA) per year for Years 1 to 4, including stipend ($22,000/yr), tuition ($20,475/yr), and health insurance ($254.67/month). These GTAs will also help in additional class sections that are needed as the BACS enrollment increases.

With respect to 5 new courses to be developed for the BACS program, we request an amount of $40K (including $16K in Year 1, and $24K in Year 2) as x-pay to current faculty to

Provide a budgetary rationale for creating this new program
The Program Budget Spreadsheet shows that the program will generate a program surplus of $30,489 in its initial year, increasing to more than $723,000 totally for the subsequent four years.