

Pittsburg State University

Bachelor of Science in Computer Science

Program Approval

I. General Information

A. Institution Pittsburg State University

B. Program Identification

Degree Level: Bachelor
Program Title: Computer Science
Degree to be Offered: Bachelor of Science in Computer Science
Responsible Department or Unit: Department of Mathematics
CIP Code: 11.0701
Modality: Hybrid
Proposed Implementation Date: August 2022

Total Number of Semester Credit Hours for the Degree: 120

II. Clinical Sites: Does this program require the use of Clinical Sites? No

III. Justification

Across the nation, the demand for Computer Science programs is high. According to a recent article from the *New York Times*, demand is so high that some universities, such as the University of Maryland, must limit enrollment. In an example closer to PSU, the University of Central Missouri graduated 56 Computer Science majors in a recent year. Demand is growing in the field as jobs are going unfilled. The University has been approached by local entrepreneurs and employers who have strongly encouraged the creation of a degree in Computer Science to help fill local and regional needs for qualified people in this field. Ability to draw computer scientists educated elsewhere to the region has been challenging. This is echoed by the University's own IT staff. While it is recognized that universities cannot afford to have programs in every discipline, some disciplines are common to almost all universities due to the nature of the level of need, being more local or regional to national or international. Computer Science is one of those disciplines. A survey of universities similar to PSU in size and mission finds that Computer Science programs are ubiquitous. The five other Regents' universities offer a BS in Computer Science, but there is still a great need for more computer programmers nationwide and locally (as illustrated in part VI below). Demand is such that a new program at PSU is warranted. This is reflected by the fact that Computer Science is one of the top programs requested by students interested in attending PSU.

When mature, the Computer Science program will draw students who also have an interest in mathematics, physics, information systems, engineering technology, and other similar, technically oriented programs. These programs have been suffering from a Computer Science shaped hole in PSU's offerings. It will operate synergistically with them. Computer Science has been a missing piece of the STEM ecosystem.

IV. Program Demand

A. Survey of Student Interest

Number of surveys administered:	4,155
Number of completed surveys returned:	407
Percentage of students interested in program: ...	19%

Of the 407 students who responded to the survey, 348 thought that PSU should have a computer science major. Of those, 77 were interested in such a major themselves. Of those 407 who responded, almost a quarter of them left comments. The following are typical:

I think this is a field that will undoubtedly be a backbone of our society for a long time to come with the rate at which technology is making advancements every day with no foreseeable end in sight. I would imagine this program could be a great advantage for students seeking jobs after graduation.

I think a computer science major would fit well at PSU.

This would be a phenomenal program to add. I am in full support.

Computers are an essential part of today's world. The need for computers and people who fully understand them will never go away, the need will only grow.

YES. Adding this degree at PSU is vital.

With the massive increase for STEM related fields, this program would fit in great at PSU.

B. Market Analysis

The job market for majors graduating with computer science degrees is extremely compelling. According to the U.S. Bureau of Labor Statistics (BLS), the 2019 median salary of someone holding the role of “Software Developer” (someone who creates applications or systems that run on computers or other devices) is \$107,510 per year. Typical entry-level education for this profession is a bachelor's degree in computer science or a related field. As of 2019, the job growth outlook for 2019-2029 is 22%, which is noted as “much faster than average.”

In addition to extremely rapid growth, there are an exceptionally large number of jobs currently unfilled for software developers or similar jobs for computer science graduates due to lack of supply. This contributes to the high salaries of individuals in these positions. According to code.org, an educational computer science advocacy institution, there are 400,000 current job openings in the united states that could be filled by computer science majors. Given the trends noted by the BLS, it is safe to conclude that this number will continue to grow.

Another indicator of the current market status can be found when analyzing the generous signing bonuses that large companies are giving to new computer science graduates/employees. Google, for instance, often awards signing bonuses for new employees in the \$15,000 to \$35,000 range. Many other companies do the same, some opting to give these employees stock in their companies as well. The conclusion that can be drawn from this is that, given the extremely high number of job openings for computer science graduates, companies have no choice but to continue to increase compensation and incentives for new recruits.

To conclude, the combination of rapid job growth, many unfilled job openings, and high salaries and incentives shows that the current market for graduates with computer science degrees puts new graduates in a highly desirable position.

V. Projected Enrollment for the Initial Three Years of the Program

Year	Headcount Per Year		Sem Credit Hrs Per Year	
	Full- Time	Part- Time	Full- Time	Part- Time
Implementation	15		450	
Year 2	30		900	
Year 3	45		1,350	

VI. Employment

Students with computer science degrees enjoy a range of lucrative employment opportunities across a wide variety of industries. Indeed, one could say that today, every company is in some form a “tech company,” from financial, to music, to sports, to manufacturing, even the companies we may not think of as traditional technology companies have been forced to engage that space. This means that students who are interested in almost any area can participate in that overall industry with a computer science degree.

Specific numbers for total current job openings and median salary can be found in the “Market Analysis” section.

A small sampling of large regional employers for graduates with computer science degrees in large numbers:

- Cerner
- Koch Industries
- Garmin
- Jack Henry
- Federal Reserve Bank of Kanas City

A small sampling of large national employers for graduates with computer science degrees in large numbers:

- Google
- Amazon
- Twitter
- Facebook
- Square
- Walmart
- IBM
- Microsoft

A small sampling of local employers for graduates with computer science degrees:

- Limelight (of Pittsburg, Kansas)
- WATCO
- Crossland
- Millers
- Midwestern Interactive
- CDL
- Jake’s Fireworks
- Pittsburg State University

One important overall note about employment with a computer science degree is that there is increasing flexibility for and availability of remote work. This trend is becoming so prevalent that a recent study showed

that 86% of IT/development professionals work remotely to some degree, with 1/3 of those working from home full time. This flexibility is becoming highly desirable, and uniquely positions Pittsburg State University graduates to succeed. as they are not geographically restricted when finding employment before/after graduation. They may choose to live in their hometowns while working remotely for concerns in metro areas.

VII. Admission and Curriculum

A. Admission Criteria

The program is open to all students who have been admitted to Pittsburg State University.

B. Curriculum

See the appendix for the list courses in the program and the requirements.

Year 1: Fall

SCH = Semester Credit Hours

Course #	Course Name	SCH 15
MATH 122	Plane Trigonometry	3
CIS 230	Introduction to Programming	3
	Pitt Pathway and electives	9

Year 1: Spring

Course #	Course Name	SCH 15
MATH 326	Mathematics for Programming	3
MATH 212	Matrix Algebra	2
EET 244	Logic Circuits	3
	Pitt Pathway and electives	7

Year 2: Fall

Course #	Course Name	SCH 15
CIS 380	Systems Analysis and Design	3
MATH 413	Introduction to Mathematical Thought	3
	Pitt Pathway and electives	9

Year 2: Spring

Course #	Course Name	SCH 15
MATH 513	Discrete Structures	3
CIS 240	Intermediate Programming	3
	Pitt Pathway and electives	9

Year 3: Fall

Course #	Course Name	SCH 15
CS 405	Principals of Software Architecture	3
CS 300	Web Application Development I	3
	Pitt Pathway and electives	9

Year 3: Spring

Course #	Course Name	SCH 15
CS 305	Web Application Development II	3
CIS 615	Database Management	3
	Pitt Pathway and electives	9

Year 4: Fall

Course #	Course Name	SCH 15
MATH 626	Data Structures and Algorithms	3
EET 344	Microcomputer Systems	3
	Pitt Pathway and electives	9

Year 4: Spring

Course #	Course Name	SCH 15
CS 410	Introduction to Frontend Frameworks	3
CS 500	Advanced Programming	3
	Pitt Pathway and electives	9

VIII. Core Faculty

Note: * Next to Faculty Name Denotes Director of the Program
 FTE: 1.0 FTE = Full-Time Equivalency Devoted to Program

Faculty Name	Rank	Highest Degree	Tenure Track Y/N	Academic Area of Specialization	FTE to Proposed Program
Tim Flood*	Professor	PhD	Y	Number Theory	0.25
Scott Thuong	Associate Professor	PhD	Y	Topology	0.25
Retired Faculty line	Assistant Professor	PhD	Y	Computer Science	1
David Newcomb	Instructor	MS	N	Programming/Introductory Math	1
Terry Martin	Instructor	MS	N	Introductory Math	0.125
Bobby Winters	Professor	PhD	Y	Topology	0.125
Eric Mayer	Professor	PhD	Y	Embedded Systems	0.25

Number of graduate assistants assigned to this program **10**

IX. Expenditure and Funding Sources (List amounts in dollars. Provide explanations as necessary.)

A. EXPENDITURES	First FY	Second FY	Third FY
Personnel – Reassigned or Existing Positions			
Faculty	\$34,111.11	\$44,695.63	\$155,086.00
Administrators (other than instruction time)			

Graduate Assistants			
Support Staff for Administration (e.g., secretarial)			
Fringe Benefits (total for all groups)	\$11,001.34	\$14,868.44	\$20,289.04
Other Personnel Costs			
Total Existing Personnel Costs – Reassigned or Existing	\$45,112.45	\$59,564.07	\$175,375.04
Personnel – New Positions			
Faculty	0	0	0
Administrators (other than instruction time)	0	0	0
Graduate Assistants	0	0	0
Support Staff for Administration (e.g., secretarial)	0	0	0
Fringe Benefits (total for all groups)	0	0	0
Other Personnel Costs	0	0	0
Total Existing Personnel Costs – New Positions			
Start-up Costs - One-Time Expenses			
Library/learning resources	0	0	0
Equipment/Technology	0	0	0
Physical Facilities: Construction or Renovation	0	0	0
Other	0	0	0
Total Start-up Costs	0	0	0
Operating Costs – Recurring Expenses			
Supplies/Expenses	0	0	0
Library/learning resources	0	0	0
Equipment/Technology	0	0	0
Travel	0	0	0
Other	0	0	0
Total Operating Costs	0	0	0
GRAND TOTAL COSTS	\$45,112.45	\$59,564.07	\$175,375.04

B. FUNDING SOURCES (projected as appropriate)	Current	First FY (New)	Second FY (New)	Third FY (New)
Tuition / State Funds	In state	\$172,880	\$345,760	\$518,640
Student Fees				
Other Sources				
GRAND TOTAL FUNDING		\$172,880	\$345,760	\$518,640

C. Projected Surplus/Deficit (+/-) (Grand Total Funding <i>minus</i> Grand Total Costs)		\$172,767	\$286,196	\$315,290

X. Expenditures and Funding Sources Explanations

A. Expenditures

Personnel – Reassigned or Existing Positions

Year 1 & Year 2

- This is based on the assumption that there will be only zero-hour freshmen enrolled at the beginning of the program, i.e. we will not be able to accept students who transfer into junior- and senior-level computer science courses during the first two years of the program. During that time, we will only need 0.75 of a faculty position during the first year and 1.25 faculty positions during the second. The salaries were calculated from particular faculty currently on staff.

Year 3

- This year we will convert the position of a professor who is on phased retirement. There is currently one member of the department of mathematics (with a salary of \$72,000) who will be retired full before 2023. In addition, there will be another faculty member (with a salary of \$50,000) in the department who will be going on half-time phased retirement at the end of AY2021. The plan is to use the salary savings to hire someone who is qualified to teach computer science.

Personnel – New Positions

None.

Start-up Costs – One-Time Expenses

None. Currently, there is a surplus of computers and computer labs on campus due to decreasing enrollment. Ultimately, given growth, we will probably have to invested in additional local computer resources, but at present the necessary infrastructure is in place.

Operating Costs – Recurring Expenses

Taken from current operating budgets.

B. Revenue: Funding Sources

Funding is from tuition only. It is based on 15 new students a year, with 10 in-state (tuition rate \$7,744/year) and 5 out-of-state students (tuition rate \$19,088/year).

C. Projected Surplus/Deficit

We project a minimum of \$170,000 surplus during each year of the program.

XI. References

- Bolden-Barrett, V. (2019, July 19). *Working remotely is now the norm for developers, new study shows*. HR Dive. <https://www.hrdiver.com/news/working-remotely-is-now-the-norm-for-developers-new-study-shows/559013/#:~:text=Eighty%2Dsix%20percent%20of%20IT,%2C%20a%20cloud%2Dbased%20platform.>
- Code. (2021). *Why computer science?* <https://code.org/promote>
- Tuttle, B. (2019, April 15). *The massive pay on offer to entry-level Google recruits*. Financial Careers. <https://www.efinancialcareers.co.uk/news/2019/04/google-student-pay>
- U.S. Bureau of Labor Statistics. (2020, September). *Software developers, quality assurance analysts, and testers*. Occupational Outlook Handbook. <https://www.bls.gov/ooh/computer-and-information-technology/software-developers.htm>

Appendix

The Computer Science Major

Code		credit
	Core	35
MATH 122	Plane Trigonometry	3
MATH 212	Matrix Algebra	2
EET 244	Logic Circuits	3
MATH 326	Mathematics for Programming	3
MATH 413	Introduction to Mathematical Thought	3
MATH 513	Discrete Structures	3
CIS 380	Systems Analysis and Design	3
CIS 615	Database Management	3
CIS 230	Introduction to Programming	3
CIS 240	Intermediate Programming	3
MATH 626	Data Structures and Algorithms	3
CS 405	Principles of Software Architecture	3
	Choose 15 hours from the following	15
CS 300	Web Application Development I	3
CS 500	Advanced Programming	3
CS 305	Web Application Development II	3
CS 400	Mobile Application Development	3
CS 410	Introduction to Front End Frameworks	3
EET 344	Micro Computer Systems	3
EET 449	Programmable Logic Devices	3
EET 549	Micro Controllers	3
EET 647	Digital Signal Processing	3
		24
	Total hours in program	50
	Upper Division in program	36
	Upper Division electives	9
	Total Upper Division	45
	Balance to be filled with general education and electives	70
	Total Degree	120