Montana Board of Regents
CURRICULUM PROPOSAL FORM

1. **Overview of the request and resulting changes.** Provide a one-paragraph description of the proposed program. Will this program be related or tied to other programs on campus? Describe any changes to existing program(s) that this program will replace or modify. *[100 words]*

   Montana State University's Gianforte School of Computing proposes to offer a Computer Science Bachelor of Arts degree. The degree enables a student to gain depth in both computer science and a second area that is not a traditional STEM area. The second area can be fulfilled by using an existing major or through a unit-defined plan (a unit such as Anthropology or Liberal Studies, can opt-in by either providing an articulated suite of courses or by designating an existing minor). The Computer Science B.A. does not replace or modify any existing programs.

2. **Relation to institutional strategic goals.** Describe the nature and purpose of the new program in the context of the institution's mission and core themes. *[200 words]*

   A Computer Science B.A. strongly supports MSU's strategic learning goal of preparing students to graduate equipped for careers. In Montana and nationwide, computer science degrees at all levels are among the most in-demand degrees. In 2016, according to http://www.forbes.com/sites/susanadams/2015/11/25/top-degrees-for-getting-hired-in-2016/, Computer Science is the second most demanded bachelor's degree, the most demanded master's degree and the second most demanded doctoral degree. In February 2017, the Montana High Tech Business Alliance reported that attracting and retaining skilled technology workers is their firms' largest impediment to faster growth.

   The proposal also strongly supports MSU's strategic access goal of widening access to higher education and ensuring equality of opportunity for all. Except for white and Asian men, all other populations are underrepresented in computing. For example, women earned only 17.9% of Computer Science degrees nationwide in Academic Year 2015-2016. Because the requirements to earn a Computer Science B.A. differ significantly from the requirements to earn a Computer Science B.S., the Computer Science B.A. will likely attract a different and more diverse student population. Studies show that teams with greater diversity are more effective at solving hard problems. Thus, a more diverse computing workforce can create a better future.

3. **Process leading to submission.** Briefly detail the planning, development, and approval process of the program at the institution. *[100 words]*

   During academic year 2015-2016, a Computer Science task force consisting of faculty and students researched and designed the initial proposal that our advisory board then vetted. During the summer of 2016, a wide variety of constituents provided input. These constituents included the Honors College Dean, the Arts and Architecture Dean, the Letters and Science Dean, the Modern Languages Department Head, the Art Department Head, and many more. In September 2016, the proposal was submitted into MSU's CiM system where significant additional feedback was incorporated from MSU's Curriculum and Programs Committee and Faculty Senate.

4. **Program description.** Please include a complete listing of the proposed new curriculum in Appendix A of this document.

   a. List the program requirements using the following table.

	Credits

Montana Board of Regents
CURRICULUM PROPOSAL FORM

Credits in required courses offered by the department offering the program	43
Credits in required courses offered by other departments	45-53
Credits in institutional general education curriculum **(unsatisfied elsewhere)**	21
Credits of free electives	3-11
Total credits required to complete the program	120

b. List the program learning outcomes for the proposed program. Use learner-centered statements that indicate what students will know, be able to do, and/or value or appreciate as a result of completing the program.

- An ability to connect computer science to an area that is traditionally non-STEM
- An ability to design, implement and evaluate a computational solution to meet desired needs
- An ability to function effectively on teams to accomplish a common goal
- An ability to communicate effectively with a range of audiences
- Recognition of the need for, and an ability to engage in, continuing professional development
- An ability to use current techniques, skills, and tools necessary for computing practices

5. **Need for the program.** To what specific student, regional, and statewide needs is the institution responding to with the proposed program? How will the proposed program meet those needs? Consider workforce, student, economic, societal, and transfer needs in your response as appropriate. *[250 words]*

There are several compelling reasons to offer this new degree. First, a Computer Science B.A. degree provides a broader set of students with the knowledge and skills needed to enjoy meaningful, in-demand, impactful careers and lives. Second, there is a statewide, nationwide and worldwide shortage of students with computing skills. Thus, a Computer Science B.A. degree will benefit Montana's economy. Third, because software is pervasive in today's world, it is important to graduate computer scientists with more diverse academic backgrounds who will have insights into new potential applications. Fourth, as discussed at the March 2016 Board of Regents Meeting in Dillon, the arts and humanities play a critical role in our world. By targeting students who have interests that are outside of traditional STEM areas, the Computer Science B.A. degree can produce students with valuable crossover skills.

6. **Similar programs.** Use the table below to identify and describe the relationship between any similar programs within the Montana University System.

Institution Name	Degree	Program Title

Montana Board of Regents
CURRICULUM PROPOSAL FORM

a. If the proposed program substantially duplicates another program offered in the Montana University System, provide a rationale as to why any resulting duplication is a net benefit to the state and its citizens. *[200 words]*

There is no other Computer Science B.A. in the MUS system. The Computer Science B.S. degree is offered by Montana State University, the University of Montana and Montana Tech.

b. Describe any efforts that were made to collaborate with similar programs at other institutions. If no efforts were made, please explain why. *[200 words]*

Not applicable. This is a new degree in the MUS system.

7. **Implementation of the program.** When will the program be first offered? If implementation will occur in phases, please describe the phased implementation plans. *[100 words]*

The program will commence upon approval. The proposal will be discussed at the September Board of Regents meeting and will then go to the Northwest Accreditation Commission. Thus, the program could potentially be offered to students as early as Spring Semester 2018.

a. Complete the following table indicating the projected enrollments in and graduates from the proposed program.

Fall Headcount Enrollment					Graduates				
AY 19	AY 20	AY 21	AY 22	AY 23	AY 19	AY 20	AY 21	AY 22	AY 23
50	100	150	200	200	5	10	15	33	33

b. Describe the methodology and sources for determining the enrollment and graduation projections above. *[200 words]*

The enrollment numbers come from **conservative** estimates based on the University of Colorado's experience with a Computer Science B.A. Within three years of its inception in 2013, there were 600 Computer Science B.A. majors. Note: CU has approximately twice the undergraduate population of MSU.

For the graduation estimates, assume that 50 new students start the program each year and that in the long-term, 65% (35 students) of those students graduate. Because this degree provides flexibility and marketability, the graduation rate is estimated to be higher than the current MSU graduation rate.

c. What is the initial capacity for the program?

We are prepared to accommodate 50 or more students.

8. **Program assessment.** How will success of the program be determined? What action would result if this definition of success is not met? *[150 words]*

The success will be determined by meeting the fall enrollment headcounts and graduation numbers provided in section 7a. Because we can offer the new program by using existing curricular offerings, there is little downside.

Montana Board of Regents
CURRICULUM PROPOSAL FORM

However, if interest is lower than our projections, we would more aggressively market the new degree to students. Based on experience at other universities and the pervasive nature of computing in today's world, a Computer Science B.A. should receive significant student interest.

a. Describe the assessment process that will be used to evaluate how well students are achieving the intended learning outcomes of the program. When will assessment activities occur and at what frequency? *[150 words]*

Our B.S. degree is ABET accredited. Since all of our courses are open to both B.S. and B.A. students, our ABET process will be used to evaluate learning outcomes. Our primary mechanisms to evaluate the attainment of learning outcomes take place when a student is a senior and are elaborated in 8b.

b. What direct and indirect measures will be used to assess student learning? *[100 words]*

Student learning is assessed via a custom exam that students take in their final semester (a direct measurement), the portfolio that they assemble for their capstone course (a direct measurement) and a graduating senior survey (an indirect measurement).

c. How will you ensure that the assessment findings will be used to ensure the quality of the program? *[100 words]*

We have an assessment committee that evaluates the results of the custom exam and the portfolio. These results (along with feedback from the graduating senior survey) are discussed at our annual faculty retreat and result in changes to our curriculum as appropriate.

d. Where appropriate, describe applicable specialized accreditation and explain why you do or do not plan to seek accreditation. *[100 words]*

The Computer Science B.S. degree is ABET accredited. ABET does not accredit the Computer Science B.A. degree so the B.A. degree will be accredited through the Northwest Accreditation Commission. Since we plan to follow our ABET procedures, we anticipate being able to receive accreditation through NAC.

Montana Board of Regents
CURRICULUM PROPOSAL FORM

Appendix A – Proposed New Curriculum

Computer Science Bachelor of Arts

Freshman Year	Credits	
	Fall	Spring
CSCI 107 – Joy and Beauty of Computing	3	
STAT 216Q – Introduction to Statistics	3	
WRIT 101W - College Writing I	3	
University Core	3	
Broadening Coursework	3	
CSCI 127 – Joy and Beauty of Data (new in AY18)		4
STAT 217Q – Intermediate Statistical Concepts[1]		3
University Seminar Core		3
University Core		3
Broadening Coursework		3
Year Total:	15	16

[1] or M 165Q or M 171Q or M 181Q

Sophomore Year	Credits	
	Fall	Spring
CSCI 132 – Basic Data Structures and Algorithms	4	
M 165Q – Calculus for Technology I[2]	3	
University Core	3	
Broadening Coursework	6	
CSCI 232 - Data Structures and Algorithms		4
CSCI 246 – Discrete Structures		3
WRIT 221 - Intermediate Tech Writing		3
Broadening Coursework		6
Year Total:	16	16

[2] or M 166Q or M 172Q or M 182Q

Montana Board of Regents
CURRICULUM PROPOSAL FORM

Junior Year	Credits	
	Fall	**Spring**
ESOF 322 - Software Engineering	3	
CS Elective	3	
University Core	3	
Broadening Coursework	6	
CS Electives		6
University Core		3
Broadening Coursework		6
Year Total:	15	15

Senior Year	Credits	
	Fall	**Spring**
CS Electives	6	
Broadening Coursework	5	
Free Elective	3	
ESOF 423–Software Eng. Applications (new in AY18)		3
CSCI 481 - Program Assessment		0
CS Elective		4
Broadening Coursework		6
Year Total:	14	13

Total Program Credits: 120

9 credits of the CS electives must be upper division credits.

The broadening coursework cannot come from traditional STEM areas (e.g. physical sciences, technology, engineering and math). The broadening coursework can be satisfied by undertaking any of the following plans:

- Plan 1: Complete a second major.
- Plan 2: Complete a unit-approved suite of disciplinary courses.
    - The suite of courses should be 27-33 credits.
    - A sample plan from the Department of Anthropology and Sociology (that is not yet approved by the department) appears below.
    - A unit can choose to use an existing 27-33 credit minor in place of defining a suite of courses.
    - If a unit chooses to participate in plan 2, there will be an advisor from the unit.
    - The first year of a modern language must also be completed (6-8 credits):

Montana Board of Regents
CURRICULUM PROPOSAL FORM

- e.g. ARAB, CHIN, FRCH, GRMN, JPNS or SPNS 101 and 102D
- Plan 3: Complete an advisor approved suite of multidisciplinary courses. This enables a student to construct a program that draws on multiple non-STEM fields.
  - o The suite of courses should be 27-33 credits.
  - o There will be an advisor(s) from the relevant field(s) or from a multidisciplinary unit such as Liberal Studies or the Honors College.
  - o The first year of a modern language must also be completed (6-8 credits):
    - e.g. ARAB, CHIN, FRCH, GRMN, JPNS or SPNS 101 and 102D

Sample Social and Cultural Anthropology Plan – 33 credits

Title: Social and Cultural Anthropology
Unit: Department of Anthropology and Sociology
Author: Larry Carucci

Required Courses (21 credits):

- ANTY101, **Anthropology and the Human Experience - 3 credits**
- ANTY215, **Human Prehistory - 3 credits**
- ANTY225, **Culture, Language, and Society - 3 credits**
- ANTY313, **Biological Anthropology - 3 credits**
- ANTY472, **Descriptive Linguistics** or ANTY473, **Language & Culture – 3 credits**
- ANTY350 **Old World Prehistory** or ANTY450 **Archaeological Theory – 3 credits**
- Capstone: ANTY425, **Social Organization or** ANTY428, **Anthropological Theory – 3 credits**

Elective Courses (12 credits):

- ANTY242, **Contemporary Japan – 3 credits**
- ANTY327, **Medical Anthropology- 3 credits**
- ANTY332, **Native North America – 3 credits**
- ANTY336, **Myth, Ritual and Religion- 3 credits**
- ANTY337, **Sex, Gender, Sexuality in Japan -3 credits**
- ANTY338, **Contemporary Pacific Societies – 3 credits**
- ANTY341, **Popular Culture – 3 credits**
- ANTY427, **Anthropology of Gender – 3 credits**
- ANTY441, **Social Movements in Japan – 3 credits**
- ANTY494, **Food and Culture** (number may be regularized in the future) – **3 credits**
- Note: ANTY 425, 428, 472, 473 may also count here, but may NOT double count