Math Program
How We Meet the Criteria for Evaluating Academic Programs
Christina Miller, Chair

Introduction: The department of Chemistry, Computer Science and Math is a department that houses two official Programs: Chemistry and Math. Within Math, however, we have three disciplines of instruction: Mathematics, Computer Science/ Information Technology, and Physics.

We have six full-time Mathematicians; 2 Full professors, 2 Assistant professors, and 2 full- time instructors. We also have one part-time adjunct. We have 3 full-time CSCI/IT professors; 1 full professor, and 2 tenured assistant professors. In Physics we usually have 2 full-time Physicists, both full professors.

In this document we will address the 7 criteria posed for the assessment of Academic Programs.

Criterion 1. Impact and overall essentiality of the Program; connection to mission/vision/ASU 2020.

Below is how the Math Program at ASU aligns with ASU 2020.

Goal 1: Academic Excellence.

Initiative 1.1. Ensure a quality education for our diverse populations by offering relevant, current and rigorous undergraduate and graduate course work. Our Program has had a capstone course for many years. This course prepares our students for jobs or success in graduate/professional programs. This has been shown to be a High Impact Practice for students. We have added new degrees to our Program, specifically, our new IT degree. This has been popular with students as this is a growing area in our country.

Initiative 1.2. Provide a responsive and professional education that fosters civic responsibility in a global culture. Students in our capstone course must engage in a research project. Many choose to design and carry out projects that are community- relevant. One student worked with the Colorado Division of Water Resources, another is working with the Mushroom Farm to automate some of their work. We have a summer internship for students (grant-funded) involving Artificial Intelligence that gives them instruction in an area not normally open to undergraduates, but also gives them real-world research experience on a project involving researchers from across the globe.

Initiative 1.3. Strategically strengthen and expand the University's undergraduate and graduate degree programs. STEM is very important right now. According to the Smithsonian Science Education Center, 2.4 million STEM jobs will go unfilled this year. To combat this problem, we have majors in Mathematics and Mathematics with an emphasis in Computer Science, IT and Physics. We also offer courses in pre-engineering and we offer a physics-involved majors; Mathematics with a Physics Emphasis. Our department offers a variety of service courses to the college, aiding biology and earth sciences in their bid to educate future leaders in STEM. We

also offer General Education Math courses as every student at the University needs to take a Math course in order to graduate.

Initiative 1.4: Enhance efforts to recruit and retain a diverse faculty…(to) foster inclusion and equity… In Mathematics, 2 of the 4 tenure-track Mathematicians are women. In CSCI/IT, 1 of the 3 are women. The department chair is a woman. The efforts to recruit and retain these ladies has resulted in an ability to have female role models for our students.

Goal 2: Student Success

Initiative 2.1: Provide flexible avenues and entry points from which to be engaged in and to progress toward their educational, personal, and career goals. Our 6 majors in Math, encompassing the areas mentioned above, give the students many options to prepare them for their varied futures. For General Education courses we have created different courses; Calculus, College Algebra, Finite Math, Liberal Arts Math and Introduction to Statistics. Each course was created with a different type of student in mind, and was created in conjunction with professors/advisors from affected areas. After careful consideration, each course was given prerequisites that are commensurate with course outcomes and with student abilities. This allows students entry into a class that will help them in their future endeavor and that they have the prior knowledge necessary to pass. We offer Developmental Math courses to aid students who need remedial courses so that they can make progress towards a degree. We offer Developmental Math and General Education Math courses every summer to help students graduate sooner. We are piloting a Saturday Developmental course this semester.

Initiative 2.2: Recruit and support eligible transfer students. The Mathematics faculty have been very involved in creating courses that are suitable for guaranteed transfer. Two faculty have been involved in Fac 2 Fac meetings, and all have been involved in creating GT-syllabi. The Department Chair works to enable students to transfer courses to or from ASU.

Initiative 2.3: Enhance student advising to ensure it is accurate, timely, and supportive of the attainment of student goals. Many of our faculty have taken part in workshops concerning Appreciative Advising. All tenure-track faculty are involved in advising and see this as a part of their load.

Initiative 2.4: Provide all students practical and hands-on experience supporting their learning and professional development. We offer a curriculum that is responsive to student interest and needs. We offer professional development opportunities as well: students can work in the Planetarium, the Math lab, be STEM Center tutors, do formal internships or choose a senior project that involves them with companies/laboratories. We have the Artificial Intelligence internship for students (Grant-funded) involving both Undergraduate students and High School students.

Initiative 2.5: Promote and increase early student engagement as a means to graduate students with a strong sense of connection Adams State University. We have the ACME club (Adams Computer, Mathematics and Engineering) that is very active. We also have a Robotics group

associated with the Space Consortium/Makerspace/STEAM (Science, Technology, Engineering, Art and Math) shop. Our Planetarium workers are in a cohort together, as are the summer internship students mentioned above. Indeed, Math/CSCI/Physics has always been good at building a strong sense of connection; the largest gift ever given to Adams State was donated by William Porter, a Math graduate of Adams State ('51).

Initiative 2.6. Identify and systematically remove obstacles to student success. Many students see their General Education Math course as an obstacle to graduation. Mathematics worked with Title V to obtain a new and better placement tool: ALEKS. Here the students are better placed, but also have the opportunity to work towards a higher math class using the ALEKS modules. Mathematics also worked with other areas to create courses that matched better with their students' needs and abilities (see 2.1). In addition, the Developmental Math Instructors worked tirelessly to revamp the Developmental Education courses to better prepare students for subsequent courses. Recently, Math Professors have incorporated Co-requisite instruction for Finite Math and Introduction to Statistics. We also offer a Math lab, staffed with free tutors (paid through Work study) to help students with their questions. We also encourage our students to tutor through the STEM Center to aid other students who are struggling in their courses.

Goal 3: Personal and Professional Development.

Initiative 3.1 and 3.2 Increase campus programming for faculty and staff that fosters and promotes inclusive excellence/ Provide opportunities for faculty and staff to earn degrees and/or certificates. The Program has had substantial involvement in campus efforts to be involved in inclusive excellence programming like CIELO, Kindred Spirits, and the annual HILOS retreats. Two faculty participated in the Escala teaching workshop that promoted better instruction for underrepresented students. We have a Developmental Math faculty member who has been working towards his Masters degree in Mathematics. Another who has taken upon himself to learn Spanish.

Initiative 3.3. Increase opportunities for faculty and staff to grow and expand in their fields. We have faculty who have been involved in SoTL, MathFest and Project NExT. We have a faculty member who created the Lunch Time Talks in Science and Math and many faculty who have presented in this series. We have had faculty attend 9 conferences over the last 5 years, and we have had many faculty enjoy conducting research with students.

Initiative 3.4. Develop institutional policies, practices, and provisions to support professional development endeavors. The department and department chair strongly support professional development endeavors. As part of the Annual Activity Summary and Professional Performance Plan faculty are evaluated on their efforts this area. The department provides funding for these endeavors, as mentioned above.

Goal 4: Access and Affordability.

Initiative 4.1 and 4.2: Develop strategies and incentives to improve persistence and completion/ Clearly communicate costs and resources. We are lucky enough to have the Porter Scholars Program available. This money, donated by William Porter, allows us to give scholarships to deserving students, award students funds to attend professional conferences or be involved in research projects, and have a dinner together once a year and hear an inspirational graduate of Adams speak about their journey. Also, as part of a strategy to improve persistence and completion, the faculty participated in the writing and the implementation of the Title V. STEM grant. This funded tutoring, STEM outreach, research, SI, and the construction of the STEM center which includes study rooms, meeting rooms, and social spaces. In addition, we have Math-specific scholarships available. These scholarships and awards help to defray the cost of the students' education, allowing them to come and remain and Adams. This is only possible because faculty work on the committee that awards money.

We also give our students access to technology they could not afford and might not expect at a school this size like SuperComputers, robots, drones, the Planetarium, the Observatory, and the chance to compete in the Robot Challenge through the Space Grant Consortium. The access to these items excites students and gives them an impetus to stay in our Program.

Initiative 4.3. Better utilize financial aid resources. We choose affordable textbooks (often free) and software. Through the STEM Center students can check out technology they may not be able to afford like calculators, laptops and iPads.

Goal 5: Community Relations.

Our faculty and students act as judges at the San Luis Valley Regional Science Fair each year. We judge hundreds of projects for students 4^{th}-12^{th} grade, and we will often mentor children in areas we do not judge. Without this work, the Fair could not exist. We staff STEM academies, one specifically for children of migrant farm workers. We teach STEM Saturdays where Valley children can come and take part in Science activities. We have an Internship that involves Artificial Intelligence, mentioned above, but also allows 2 high school students to be involved in the research in the summer. We write an annual newsletter that is sent out to alumni, detailing our current activities, inviting them to let us know what they are up to, and giving them the opportunity to donate to scholarships and gift funds. We staff and maintain the Planetarium and Observatory, hosting hundreds of Valley children, their parents, and campus community members at Planetarium shows and Observatory evenings. The Makerspace (STEAM shop) is available for the community to come and build items like robots or work on Science Fair projects. Some of our senior projects involve community companies or entities. We have offered workshops to Valley teachers concerning the use of Arduino in the classroom. The campus publishes a Community Resource list and we are on it. Most of the professionals in Computing Services here on campus are graduates of our Computer Science Program.

Criterion 2. Quality of the Program Outcomes.

1) Results of annual assessment reports.

It is hard to compare the last five years since the 2014-15 assessment was done with a slightly different rubric than in recent years and prior assessments were done with a very different rubric. However, if we compare the corresponding questions we see that:

For question 1, Information/Evidence/Data Gathered to Inform Department of Student Learning, the numbers are 1.5, 1,14 and 1.0. Clearly, in this area, the Program has been steadily declining over the last three years, and received A and A for years previous. We must do a better job of gathering data, as evidenced by one reviewer comment "No clear targets/benchmarks, poor use of data, no efforts to improve pedagogy to promote student learning".

For question 2, Planned Actions Based on Discoveries about Students and Their Learning, the grades are: E, E, 1.5, 1.71 and 1.33 for an average of 1.7. This indicates that we are trying to make data-driven decisions for the future.

For question 3(a), Departmental Discussion of Information – Faculty Involvement, the grades are: 1.83, 1.71, 1.83. This is a very high average, indicating that the Program as a whole meets to discuss the information and are all involved each year. However, it appears that grades of A were seen in the two years previous to this rubric, indicates that we made improvements here.

For question 3(b), Departmental Discussion of Information – Quality of Discussions, the numerical scores are: 1.5, 1.71, 1.8. This is nearly as high as above, indicating that we are working towards making sound decisions for the future as was articulated by a reviewer:
"Very detailed report and appears the department have very robust conversations about assessment."

For question 4, Support/Resources, the numerical scores are: 1.5, 1.71, 1.5. This lower average indicates that our requested resources, if any, somewhat align with evidence or are somewhat realistic. We need to better show how requested resources would help our Program, as was noted by a reviewer:
"There is a lack of benchmarks or metrics for data. No quantitative analysis is included to demonstrate that SLO's are being met. The report relies predominantly on anecdotal evidence."

This is especially true when one realizes that we received E's in this area in previous years.

Overall, the evaluators seemed pleased with our assessment, but there is room for improvement. The results of each assessment are shared with the faculty in preparation for (hopefully) better assessment in the future.

2) Scores of graduates on National Assessments.

The students in Math take the Major Field Assessment Test during their senior year in the capstone course. A national percentile score is earned. Here are the percentile scores below for graduating Math majors for the last 3 years:

F14: 55, 13
S15: 3, 7, 41
F15: 2, 36, 43
S16: 12, 39, 47, 56, 85
F16: 39
S17: there were technical issues with administration of exam and so there are no scores.

Overall we can see a great deal of variability, which is not unexpected when our numbers of graduates are small. We also see that the percentile values are low, but realize that a score of 43 indicates that this student did better on the exam than 43% of the students across the nation who took this exam.

3-4) Jobs secured by graduates and Admission to professional schools.

Please see the table below:

Graduation Year	Semester	Degree	Post-Graduation Information
2007/08	Fall	B.A. Mathematics	Various jobs, now working for social security office and working on a business degree, living in Missouri
2007/08	Spring	B.S. Math/Csci	
2007/08	Summer	B.A. Mathematics	Living in Highlands Ranch, stay at home mom with three boys, Masters of Mathematics from University of Colorado in Colorado Springs
2007/08	Spring	B.A. Mathematics	Working at Adams as developmental math teacher, finishing Masters of Mathematics from University of Houston this summer
2007/08	Summer	B.S. Math/Csci	Programmer in Golden, Colorado; masters from University of Colorado in Colorado Springs
2007/08	Summer	B.S. Math/Csci	Programmer in Utah
2007/08	Spring	B.A. Mathematics	Stay at home grandpa, handyman, living in Maryland
2008/09	Fall	B.A. Mathematics - Secondary Licensure	
2008/09	Spring	B.S. Math/Csci	
2008/09	Spring	B.S. Math/Csci	
2008/09	Spring	B.A. Mathematics	Professional Athlete
2008/09	Spring	B.S. Mathematics - Physics	
2008/09	Spring	B.A. Mathematics	
2009/10	Fall	B.A. Mathematics - Secondary Licensure	Taught at AHS, and later Sangre de Cristo School, moved to Texas
2009/10	Fall	B.A. Mathematics	Programmer at Los Alamos
2009/10	Spring	B.A. Mathematics	

2009/10	Spring	B.A. Mathematics	Insurance salesman
2010/11	Spring	B.S. Math/Csci	
2010/11	Spring	B.A. Mathematics	Teaching in Alamosa
2010/11	Spring	B.A. Mathematics	Grad School U of Illinois
2010/11	Spring	B.A. Mathematics	Computing Services- ASU
2011/12	Fall	B.A. Mathematics	
2011/12	Spring	B.A. Mathematics - Secondary Licensure	Living in La Jara, working at Centauri Middle School
2011/12	Fall	B.A. Mathematics	
2012/13	Fall	B.S. Mathematics - Physics	
2012/13	Fall	B.S. Mathematics - Physics	
2012/13	Fall	B.S. Mathematics - Physics	
2012/13	Fall	B.A. Mathematics	
2013/14	Spring	B.A. Mathematics - Secondary Licensure	
2013/14	Spring	B.S. Mathematics - Computer Science	
2013/14	Spring	B.S. Mathematics - Physics	
2013/14	Fall	B.A. Mathematics	Agro Engineering
2013/14	Fall	B.A. Mathematics	
2013/14	Spring	B.A. Mathematics	Grad School- U of Utah (Philosophy)
2014/15	Fall	B.S. Mathematics - Physics	Teaching at AHS
2014/15	Fall	B.S. Mathematics - Physics	
2014/15	Fall	B.A. Mathematics - Secondary Licensure	Taught at Sangre de Cristo
2014/15	Fall	B.A. Mathematics (with licensure)	Teaching at Sargent HS or Center
2014/15	Spring	B.A. Mathematics - Secondary Licensure	Teaching at Sangre de Cristo
2014/15	Spring	B.S. Applied Mathematics	
2015/15	Spring	B.S. Applied Mathematics	
2015/16	Fall	B.S. Mathematics- Computer Science	National Security Agency
2015/16	Fall	B.S. Mathematical Sciences – Physics	
2015/16	Summer	B.S. Mathematics - Computer Science	
2015/16	Spring	B.S. Mathematics - Computer Science	
2015/16	Spring	B.S. Mathematics - Physics	Walmart. Looking into military
2015/16	Spring	B.S. Mathematics - Physics	
2015/16	Spring	B.S. Mathematics - Computer Science	

2016/17	Fall	B.S. Computer Science	
2016/17	Fall	B.A. Mathematics-Secondary Education	Teaching in Kiowa, CO
2016/17	Spring	B.S. IT	
2016/17	Spring	B.A. Math	Teaching at TSJC/ looking into grad school
2016/17	Spring	B.S. IT	Working in Denver for the Organization he Interned with during school.
2016/17	Spring	B.S. Computer Science	
2016/17	Spring	B.A. Mathematics - Secondary Licensure	Teaching in Sanford

This table indicates what we know about our graduates, which is incomplete. In fact, of the 55 here, there are 26 that are unaccounted for. Students names are added to the list when they turn in graduation applications and the two IT majors listed above have yet to earn their degrees. We do not know the rates of admission to graduate or professional schools, but we can see above that some are accepted. In fact, it appears that there were 5 that we know of who were accepted and attended graduate school. Most have jobs in their field whether or not they went to on to other programs.

Criteria 3. Demand for the Program.

1. **Internal Demand: Induced Course Load Matrix.** In Math we have seen some variability in the number of SCH generated by the Program. In 12/13 it was 7645, in 13/14 it was 11208, in 14/15 it was 11999, in 15/16 it was 7149 and in 16/17 it was 5343. (In these numbers, numbers for IT were added in with math.)

Service to other areas. In Math we serve Math majors, but we also serve all STEM majors. All STEM students take at least College Algebra (103 this fall/ 76 this spring) and Trigonometry (35 fall/56 spring). Many take Calculus I (29 this fall) and II (15 this spring) and some take Calculus III (5 this fall).

Many STEM students also require Physics. For these students we offer College Physics I (40 this fall) and II (22 this spring), and General Physics I and II (~5).

Service to General Education. Every student at Adams State University must take at least one Math class for General Education. For this purpose, Math offers courses that are solely General Education offerings: Finite Math (128 this fall, 82 this spring), Introduction to Statistics (new this year), and Liberal Arts Math (~40 each semester), and also offers courses that count both for General Education and for majors: College Algebra, Trigonometry, and Calculus I and II.

All students must also take 7 credits of Science. Physics offers Light, Introduction to Astronomy (offered on-line), Astronomy I and II (~40) , College Physics (~35), and General Physics I and II (~5).

1. **Employment Opportunities. National and State Statistics.**

According to the Bureau of Labor Statistics, Statistics, Software Developers and Mathematicians will be among the 10 fastest growing occupations between 2016 and 2026.

Statisticians: up 30.5%
Software Developers: up 33.4%
Mathematicians: up 29.4%
This indicates that Math/CCSI is an area that is growing nationally.

In fact:

Job	2016 positions	2026 projection for positions
Computer Information Systems	367,600	Up 44,200
Software Developers	256,200	Up 302,500

And State and National Trends for Employment of Physics (Bachelor's degree only):

	2016 Employment	2026 Projected Employment	% Employment Change	2016 Median Income
National*	23,500	25,100	+2.0%	$96,070
Colorado**	1,025	1,213	+1.70%	

* https://data.bls.gov/projections/occupationProj

**https://www.colmigateway.com/vosnet/analyzer/results.aspx?session=occproj&pu=1&plang=E

This indicates that the job outlook for physicists is good, as well.

2. **10-year trend of ASU graduates.**

See the table below:

	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17
BA Mathematical Sciences	3	2	3	2	2	1	3	1		1
BS Math Sciences: Comp Science	4	3		1	2		1		3	2
Mathematics: Sec Ed (BA)		1	1		1		2	2		2
BS Math Sciences: Physics						3	1	2	3	
Applied Mathematics (BS)								1	1	
Mathematics (BA)							1			
Total	7	6	4	3	5	4	8	6	7	5

There is not a clear pattern here for graduates. It is not clear what average could be used. Perhaps it is best to generalize that we have 4-7 graduates per year, excluding the low of 3 and the high of 8. The highest number of graduates goes to B.A. Mathematics with a total of 18 over 10 years, followed by B.S. Mathematical Sciences: Computer Science with 14, followed by a tie between B.A. Mathematics: Secondary Education and B.S. Math Sciences: Physics with 9, and

in last place is B.S. Applied Mathematics with 2 and B.A. Mathematics with 1. Our Mathematics: IT degree is only three years old, and so has no graduates listed yet.

3. National, State and Local Enrollment Trends.

This information comes to us from the CDHE for state trends:

	2011	2012	2013	2014	2015	2016	2017
Mathematics	232	285	279	320	324	278	305
Mathematics & Computer Science	50	50	47	39	32	0	0
Computer Engineering	0	15	18	12	24	29	40
Computer Information Systems	108	92	87	100	108	128	109
Computer Science	176	176	197	298	341	404	505
Computer Science & Security		0	0		0	0	0
Computer Science Information Systems	13	11	0	0	0		
Information Technology Management		22	94	162	224	294	254
Physics	83	99	98	100	120	110	110

The 0 reported for Mathematics and Computer Science indicates that fewer than 10 graduates were reported for that year to the CDHE. We see Computer Science and Information Systems listed in other ways on the table. Our Information Systems major is growing, just as it is nationally. Our major is only three years old and while we don't have any graduates who have received their Bachelor's degree yet, we have 7 majors in the pipeline

This information is from the National Center for Education Statistics for national trends for Math and Physics:

	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
Mathematics and statistics	17,182	18,841	20,449	20,987	21,853
Physical sciences and science technologies	24,705	26,664	28,053	29,307	30,038

Criterion 4. Size. Scope and Productivity of the Program.

1. **Number of Degrees awarded.** The number of total degrees awarded in the Math Program are shown in the table below.

Years	12/13	13/14	14/15	15/16	16/17
# of Degrees	**4**	**8**	**6**	**7**	**5**

2. **The Number of Degrees Awarded/ Full-time Faculty Member.** In the table below, I have divided the number of degrees awarded by the number of full time faculty members teaching within the major. I have not included our Developmental Education faculty members, as they do not teach majors courses. The 0.5 in the calculation is when the Department chair was in the Math Program, the 0.75 designation is when the Program Coordinator was in the Math Program.

Years	12/13	13/14	14/15	15/16	16/17
Calculation	4/6.5	8/6.5	6/7.5	7/7.5	5/7.75
Quotient	**0.62**	**1.2**	**0.80**	**0.93**	**0.65**

3. **Total SCH Generated by the Program.** See the table below. I have split out the SCH by discipline and then given a total for the Program.

Years	12/13	13/14	14/15	15/16	16/17
Math	7645	11208	11936	7081	5237
CSCI	332	424	469	543	397
Physics	949	988	788	692	663
IT	0	0	63	68	106
Total	**8596**	**12620**	**13256**	**8384**	**6403**

4. **SCH Generated by the Program per Full-time Faculty member.** See the table below. Here I have added in full-time developmental education professors since their load is made of courses with MATH prefix.

Years	12/13	13/14	14/15	15/16	16/17
Calculation	8596/6.5	12620/6.5	13256/8.5	8384/9.5	6403/9.75
Quotient	**1323**	**1942**	**1560**	**883**	**657**

5. **Service to Campus.** See the table below. "Professor" designations are randomly assigned to folks in the Program, but are consistent throughout the table. This table was generated with help from present faculty. Non-participation of faculty in committee work may actually be due to the fact that they were no longer present to help with the table.

Committee	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
Academic Master Plan				Professor 1		Professor 2
Academic Program Criteria Group						Professor 3
Accreditation Engagement			Professor 1			Professor 1
Admissions and Transfer Advisory Board (Statewide)	Professor 4					
Athletic Solutions Group				Professor 4	Professor 4	
CIELO	Professor 4	Professor 4	Professor 4	Professor 4	Professor 4	Professor 4
Colorado Mathematics Pathways Taskforce			Professor 5	Professor 5	Professor 5	Professor 5
Curriculum Innovation Team		Professor 3	Professor 3	Professor 5 Professor 3	Professor 2 Professor 5 Professor 3	Professor 2 Professor 5 Professor 3
Curriculum Review	Professor 1	Professor 1, **Chair**	Professor 3	Professor 3, **Co-Chair**	Professor 3, **Co-Chair**	
Faculty to Faculty State Conference		Professor 6		Professor 6		
Faculty Senate	Professor 1	Professor 1	Professor 1	Professor 1	Professor 1	Professor 1
FTAC	Professor 3, **Chair**	Professor 3, **Chair**	Professor 3, **Chair**	Professor 6	Professor 6	Professor 6
Five-Year Program Review						Professor 1
General Education Coordinating					Professor 5	Professor 5
Graduation	Professor 7 **Faculty Marshall**	Professor 7 **Faculty Marshall**	Professor 7 **Faculty Marshall**	Professor 7 **Faculty Marshall**	Professor 7 **Faculty Marshall**	Professor 7 **Faculty Marshall**
Handbook	Professor 3			Professor 3		
Mathematics Association of America Regional Meeting at ASU	Professor 5, Professor 6 **Co-Chairs**					
New Program Approval Process					Professor 1	
HLC Criterion			Professor 4, **Chair (**one)	Professor 4, **Chair (**one)	Professor 4, **Chair (**one)	Professor 4, **Chair (**one)

				Professor 1, **Co-chair.** (four)	Professor 1, **Co-chair.** (four)	Professor 1, **Co-chair.** (four)
HLC Steering			Professor 4	Professor 4 Professor 1	Professor 4 Professor 1	Professor 4 Professor 1
Makerspace		Professor 7, **Co-Founder, Chair**	Professor 7, **Chair**	Professor 7, **Chair**	Professor 7, **Chair**	Professor 7, **Chair**
Masters Thesis					Professor 8 (HPPE)	Professor 8 (HPPE)
Institutional Appeals				Professor 1		
Peer Recognition			Professor 7	Professor 1		
Porter Scholars	Professor 4, **co-Chair** Professor 1	Professor 5 Professor 4, **co-Chair**	Professor 5 Professor 4, **co-Chair**	Professor 5 **co-Chair**	Professor 8 Professor 5 **co-Chair**	Professor 8 Professor 5
Pre-baccalaureate					Professor 2	
President's Cabinet	Professor 4	Professor 4		Professor 4	Professor 4	Professor 4
Promotion and Tenure		Professor 8	Professor 1			
Promotion to Professor	Professor 6, **Chair**	Professor 5	Professor 5	Professor 8, **Chair**	Professor 8	
Retention (outside dept.)	Professor 4, **Chair** (Nursing)	Professor 5 (nursing)	Professor 5 (nursing, music)	Professor 5 (nursing, music)	Professor 5 (music)	
Retention, Tenure and Promotion Update			Professor 8			
Search (Outside dept.)			Professor 1 (Asst Athletic Director for Academic Affairs)	Professor 4, **Chair**. (Business chair) Professor 1 (Senior IR Analyst) Professor 1 (Data Analyst)	Professor 8 (STEM Coordinator) Professor 2 (Admin asst.)	Professor 4, **Chair**. (Psychology chair) Professor 1 (Director of Assessment)
Space Consortium	Professor 7, **Affiliate Director**	Professor 7, **Affiliate Director**	Professor 7, **Affiliate Director**	Professor 7, **Affiliate Director**	Professor 7, **Affiliate Director**	Professor 7, **Affiliate Director**
Strategic Planning				Professor 4, **Chair** Professor 6	Professor 4, **Chair**	Professor 4, **Chair**
Student Learning Assessment				Professor 1, **Chair**	Professor 1, **Chair**	Professor 1, **Chair**
Student Scholar days				Professor 2	Professor 2	Professor 2

Title V steering				Professor 4	Professor 4	Professor 4
Fraction of tenured and tenure/track faculty engaged in committee work	**6/7**	**7/7**	**5/8**	**8/8**	**8/8**	**8/8**
Fraction who chaired one or more committees	**5/6**	**4/7**	**4/5**	**6/8**	**6/8**	**3/8**

Others:
Instructors: Pre-baccalaureate (2016/17) , Writing Across the curriculum (2015/16)
Adjunct: Math task force for developmental math overhaul (2013-15.)

6. **Service to Community and Community Engagement.** The list below was generated with the help of faculty. There were some who did not respond, but who are engaged in like-activities. The "Professor" designation was random and does not represent the designations shown in the table above.

	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
Professor 1				Science Fair Team Leader STEM Saturday (X2) Summer STEM Academy MEP STEM Academy	Science Fair Team Leader STEM Saturday	STEM Saturday STEM Saturday Financial Literacy Class at La Puente Volunteer at Public Library
Professor 2	Science Fair Team Leader Twice Weekly Planetarium Shows	Science Fair Team Leader	Science Fair Team Leader Twice Weekly Planetarium Shows	Science Fair Team Leader Twice Weekly Planetarium Shows	Science Fair Team Leader Twice Weekly Planetarium Shows	Science Fair Team Leader Twice Weekly Planetarium Shows
Professor 3	Science Fair Judge	Science Fair Judge	Science Fair Judge	Science Fair Judge	Science Fair Judge	Science Fair Judge
Professor 4						Science Fair Board
Professor 5					STEM Saturday	

Adjunct	**Judge Coordinator,** Science Fair Alamosa Farmers Market Board	**Judge Coordinator,** Science Fair Alamosa Farmers Market Board	**Judge Coordinator,** Science Fair Alamosa Farmers Market Board	**Judge Coordinator,** Science Fair Alamosa Farmers Market Board	**Judge Coordinator,** Science Fair Alamosa Farmers Market Board	**Judge Coordinator,** Science Fair Alamosa Farmers Market Board
Professor 6	Work Shop for GT Work Shop for 4th and 5th Graders **President** of Monte Vista School Board	**President** of Monte Vista School Board STEM Saturday Work Shop for 4th and 5th Graders Science Fair Judge Team Leader	**President** of Monte Vista School Board 2 STEM Saturdays Work Shop for 4th and 5th Graders Sience Fair Judge Team Leader	**President** of Monte Vista School Board STEM Saturday Science Fair Judge Team Leader	**President** of Monte Vista School Board 2 STEM Saturday Science Fair Judge Team Leader	
Professor 7	Presented Makerspace information to Centauri and Ortega Middle Schools	STEM Academy STEM Saturday	STEM Saturday Organized Makerspace Summer Workshops (10) Instructor for 6 day workshop	Middle school presentation on Maker Space Workshop on Arduino for K-12 Teachers Saturday Arduino community Open Makerspace most Wednesdays	Open Makerspace most Wednesdays	Open Makerspace most Wednesdays

7. **Other Service.** The Mathematics Program maintains the Math Lab where students can drop in for help. This is staffed by Upper divisional work study students who are managed by a faculty member.

Criterion 5. Cost and Benefit of the Program.

1. **Salaries and Program Delivery Costs (Including Administrative Costs and specialized Course Support Costs.)**

Overall Cost. Please see the table below:

Compensation for Math/CSCI Faculty (not Instructors)	$408, 582
Benefits for them	$155,539
Compensation for Math Developmental Faculty (Instructors)	$68,004

Benefits for them	$28,218
Operating Expenses	$5475
Physics Faculty Compensation	$144,044
Benefits for them	$55,089
Operating Expenses	$6603
Planetarium	$13,715
Administrative Assistant (Including benefits), shared between 4 Programs	$53,311/4 = $13,328
Porter Hall Budget, shared between 4 Programs	$10,236/4 = $2559
Course Specific Fees for Physics and Math	$1,451
Total	**$902,567**

Cost per Full-time Faculty Member. Please see the table below, which includes our Full Time Instructors of Developmental Math:

Year	2014/15	2015/16	2016/17
Calculation	$902567/8.5	$902,567/9.5	$902,567/9.75
Quotient	**$106,188**	**$95,007**	**$92,571**

Cost per Graduate. For this calculation, I will remove the Compensation and Benefits for the Developmental Education Instructors, since they do not teach majors courses. Please see the table below:

Year	2014/15	2015/16	2016/17
Calculation	$806,345/6	$806,345/7	$806,345/5
Quotient	**$134,391**	**$115,192**	**$161,269**

Cost per SCH. See the table below. Total cost here includes Developmental Math.

Year	2014/15	2015/16	2016/17
Calculation	$902,567/13,256	$902,567/8384	$902,567/6403
Quotient	**$68**	**$108**	**$141**

2. **Revenue Generated by the Program.**

Grants. Faculty in the Math Program have been prolific grant writers over the years and have generated much revenue. Designation with "Professor #" are random and not indicative of earlier designations.

Professor 1: Colorado Space Grant Consortium. 2013-2018, **$6,000 per year.** Makerspace Kickoff Grant, **$20,000** in 2015, Daniel and Jent Mordecai Foundation.

Professor 2: NSF TUES Program, 8/1/2013-4/30/2015, **$31,000**. US Dept. of Defense,

Research & Education for HBCU/MI, 8/21/15-8/20/18, **$501,159.** NSF, IUSE Program, 1/15/2017-12/31/2019, **$174,585**. ARO HSAP grant, 2016-2018, $**14,723.**

Professor 3: US Department of Defense Instrumentation Award, 2014 **$248,681.** 8/16. NSF ADVANCE Grant**. $249,571 total funding, $45,847 indirect cost.**

Total funding for the last 5 years: $1,239,749.

Donations. We are very thankful to our donors throughout the years. Most are graduates of our Programs. Below are donations from the last three years, within category of donation.

Math/Computer Science Gift fund: $13,050
Loser Family Scholarship: $26,900
Merle Milligan Outstanding Student Award in Math and CSCI: $2,000
Matthew Miller Memorial Scholarship: $25,400
Total: $67,350

3. **Formal and Documented Recruiting Efforts by Program Personnel.**

All of our Faculty have engaged in being Team Leads for Judging at the San Luis Valley Regional Science Fair every year they have worked at ASU. Most have also taught STEM Saturdays and been involved in STEM Academies. In addition, two have been involved in New Student Orientation, one helped with ASU Road Trip and one helped with ASU Soccer Camp. We do not know if any of these recruiting opportunities have resulted in students coming to or staying at ASU, but do believe that our efforts have helped Valley children/ new ASU students and we are glad for that.

Criteria 6. Faculty and Program strengths and accomplishments.

1. **Faculty credentials, skills, flexibility, breadth/depth.**

We have four Tenured/tenure track faculty teaching in the Mathematics major. All four have earned a Ph.D. in Mathematics. All four rotate through the Math curriculum. Thus, all four have equally impressive skills and flexibility to teach our varied Program.

We have two Instructors of Developmental Math Education. One has earned a Bachelor's degree in Math and a Master's Degree in Education. The other has earned a Bachelor's degree in Math and has nearly completed a Master's Degree in Math. These two both teach courses that are not considered College-Level courses and so the qualifications set by the HLC do not apply. They lack some flexibility, in that they are only qualified to teach Developmental Math, but once our second Instructor has earned in Master's in Math, his flexibility will increase.

We have three Tenured/tenure-track faculty teaching in the area of CSCI or IT. One has earned a Ph.D. in Math, but has publications/grants in Robotics and Artificial Intelligence. This Professor teaches courses dealing with these subjects, but also Programming and could teach Math, if necessary. One holds a Master's degree in Computer Information Systems and Ph.D. in

Business Administration. This Professor teaches all IT courses and some CSCI. The third holds a Master's in Electrical and Computer Engineering and teaches most of the programing courses and much of the hardware courses.

We have Two Tenured Physics Professors. Both have earned a Ph.D. in Physics. Both take turns teaching General and College Physics, as well as upper-divisional Physics. One teaches the Astronomy courses and the other the pre-Engineering courses we offer.

2. Quality of the curriculum

a) Physics. Our curricula for Physics aligns fairly well with the IOP Institute of Physics Core of Physics. The most notable gap is that we have no course in Condensed Matter and Thermodynamics. While a Thermodynamics course is taught at ASU, it is taught in the Chemistry Program and so is taught from a Chemistry standpoint rather than a Physics one.

b) Math. The Committee on the Undergraduate Program in Mathematics (CUPM) of the Mathematical Association of America (MAA) regularly publishes recommendations for bachelor's degree Programs. The most recent version is from 2015, abbreviated the "CUPM Curriculum Guide." Specifically, it includes Cognitive Goals and Content Goals. They are:

Cognitive:

1. Students should develop effective thinking and communication skills.
2. Students should learn to link applications and theory.
3. Students should learn to use technological tools.
4. Students should develop mathematical independence and experience open-ended inquiry

And in content:

1. Mathematical sciences major Programs should include concepts and methods from calculus and linear algebra.
2. Students majoring in the mathematical sciences should learn to read, understand, analyze, and produce proofs at an increasing depth as they progress through a major.
3. Mathematical sciences major Programs should include concepts and methods from data analysis, computing, and mathematical modeling.
4. Mathematical sciences major Programs should present key ideas and concepts from a variety of perspectives to demonstrate the breadth of mathematics.
5. Students majoring in the mathematical sciences should experience mathematics from the perspective of another discipline.
6. Mathematical sciences major Programs should present key ideas from complementary points of view.
7. Mathematical sciences major Programs should require the study of at least one mathematical area in depth, with a sequence of upper-level courses.
8. Students majoring in the mathematical sciences should work, independently or in a small group, on a substantial mathematical project that involves techniques and concepts beyond the typical content of a single course.
9. Mathematical sciences major Programs should offer their students an orientation to careers in mathematics.

Our majors meet these Goals:
BA Mathematics: Meets 1-4 and 1-6,8,9
BA Mathematics Secondary (Track 1): Meets 1-4 and 1-6,8,9
BA Mathematics Secondary (Track 2): Meets 1-4 and 3-6,8,9
BA Pure Mathematics: Meets 1-4 and 1-9
BS Applied Mathematics: Meets 1-4 and 1,3-6,8,9
BS Mathematical Sciences: Meets 1-4 and 1,3-6,8,9

c) Computer Science (CSCi) and Information Technology (IT) emphasis areas both adopted the ACM Curriculum Guidelines. CSCi was modeled after the CS2008 Curriculum Update: The Computing Curricula Computer Science Volume.

Curriculum Guidelines for Undergraduate Programs in Computer Science, which can be found at: https://www.acm.org/binaries/content/assets/education/curricula-recommendations/computerscience2008.pdf. IT was modeled after the IT 2008: The Computing Curricula Information Technology, which can be found at: https://www.acm.org/binaries/content/assets/education/curricula-recommendations/it2008-curriculum.pdf.

Both areas will begin another review of curriculum to implement changes made nationally or stemming from ACM curriculum guidelines. At the present time ACM has updated the IT Guidelines by creating the Information Technology Curricula 2017 IT2017 Curriculum Guidelines for Baccalaureate Degree Programs in Information Technology located at https://www.acm.org/binaries/content/assets/education/curricula-recommendations/is-2010-acm-final.pdf. The CSCi curriculum was last updated in 2013 and is located at https://www.acm.org/binaries/content/assets/education/cs2013_web_final.pdf.

3. Quality of Physical, online or other Resources.

Math: We have licenses to Mathematica and Matlab, and those programs run on the computer labs. We occasionally use free software in our classes, such as Geogebra and Desmos. Most of our majors also learn to type mathematics using LaTeX and our gen ed students use Excel on occasion when learning statistics.

CSCI/IT: Supercomputers: 3 Intel Phi Computers, 2 Nvidia GPGPU machines
Laptops: 7 dedicated Dell laptops for AI and robotics internships (soon to be 9), soon to be 1 Macbook Pro laptop dedicated to AI and robotics internships
Other hardware: 2 Logitech webcams, 1 Konfitel speaker system, CNC mill and lathe
Software: Mathematica licenses, Matlab Classroom licenses, Vensim PLE system dynamics software
Programming languages: Java, C++, Python, Ruby, Scheme, Haskell, Prolog, Netlogo
Robotics: 6 NAO humanoid robots, 2 Robokind heads, 4 Professor Einstein robots, various lego robots and rover robot, 2 Clearpath Huskey ground vehicle robots
Makerspace Equipment: Rework Station, DC power supplies, Raspberry Pi computers, Tools, Multimeters, CNC mill and lathe, 3 3d printers, laser cutter, electric crucible, vacuum casting

unit, small mold kiln, programmable power supply, oscilloscope, soldering units, air compressor, chop saw, small acetylene wlding kit, and drill press.
Miscellaneous hardware: Tablets and various old computer equipment to use for parts, some old routers and wireless routers for networking, CAT6 cable, cable tester, associated wire crimpers, punch-down tool, Tool kit for working on various computer parts. (small screwdrivers and other specialized tools.)

Physics: The physics labs are equipped with modern laptop computers with software and sensors for measuring force, light intensity, motion (position, velocity, acceleration), electric current, magnetic field strength and direction, and more. Students use these systems in labs to gather real-time data and then examine it in graphical form. They can quickly see the effects of varying parameters, as well as verifying their ability to predict experimental outcomes using theory learned in the classroom. We also have extensive optics equipment for demonstrations and hands-on experimentation in the lab. Our electronics lab is equipped with basic electronics parts and test equipment as well as modern Arduino microcontrollers with dozens of sensors, actuators, and displays. These give students hands-on experience and a solid working knowledge of electronic interfacing and design and microcontroller programming techniques that are very marketable in industry today. We also have an extensive collection of equipment for the design, building, programming, and testing of Lego robots. For astronomy we have a large selection of telescopes, from beginner level to state-of-the-art, research-grade mounts, telescopes, cameras, and spectrometers, all housed in a modern observatory. The facility is designed to accommodate class and public viewings, as well as student research projects. Our planetarium contains a top-of-the-line digital projection system and spherical screen, perfect for astronomy lessons as well as public outreach.

Criteria 7. Future Potential of the Program.

Opportunities to reconfigure or strengthen the Program to the benefit of the university. Due to successful grants, we have greatly expanded our AI and robotics Program. Our CSCI and IT professors continue to seek out new funding opportunities to continue and to expand this important work. Our goal is to make ASU a destination of choice in the area.

We have begun the work towards co-requisite instruction in our developmental mathematics courses. In 2016-17 we ran a pilot course for MATH 104, in 2017-18 Title V is funding the creation of a complete Co-requisite course for MATH 110, which will be taught next fall. Title V has agreed to fund the creation of complete co-requisite courses for MATH 104 and MATH 150 for the future.

Potential for Program growth/adaptation with trends in the discipline, student needs, national trends, etc. STEM fields are rapidly growing, and our Program has worked to fill the need. Two years ago the Program began an IT major. This is a growing area nationally and has seen great growth at Adams as was shown in criterion 3. We also offer certificate courses within the IT Program that other areas of campus may be interested in, and we plan to advertise those to the campus at large.

Potential for development of appropriate online presence. We are currently partnered with three other institutions to offer upper- divisional Math, CSCI, and interdisciplinary CDSE (computionally data-enabled science and engineering) courses. The courses are taught at one school, and broadcast live to other schools so that all students can participate. Last semester an interdisciplinary Geology course (students needed to use Raspberry Pi computers along with data sensors for data collection and analysis) was taught in Virginia in this manner, but was broadcast live here for our students. This allows upper divisional courses to be taught, with very minimal cost even though the number of students at each school is small. All this work is currently paid for by a grant, but could be continued in the future. We plan to build upon the success of these efforts by recording all of our CSCI/IT courses during the next few academic years and create online CSCI and IT Programs.

Potential for growth of Interdisciplinary Programs. In addition to our interdisciplinary efforts through our online collaborations, we have the STEAM shop now on campus and we know that the A (Art) in STEAM is very interested in expanding the use of the shop for their students. We imagine that we could be instrumental in teaching faculty and students how to use the equipment there and may move other equipment to that space for interdisciplinary use. This might lead to an Art Technology minor or perhaps to an Industrial Design Program.

Opportunities for collaboration or partnerships with other institutions. Another area of national and institutional growth is that of students interested in Engineering. We, of course, do not have an Engineering Program at Adams, but if we could offer a true pre-Engineering curriculum, perhaps we could begin an articulation agreement with CSU or School of Mines such that students could take two years of courses at Adams and two years at an Engineering school.

We have also recently been approached by CSU to be involved in an NSF grant to study ways to help broaden participation and inclusion in Engineering and Computer Science Programs through curricular change. We plan to take part in this Program.