

ANTELOPE VALLEY COLLEGE

DIVISION OF MATHEMATICS, SCIENCE AND ENGINEERING

SYSTEMATIC PROGRAM REVIEW

SELF-STUDY

FALL SEMESTER 2007

**The Discipline Faculty
Dr. Leslie S. Uhazy, Dean**

May 7, 2008

INTRODUCTION

Programs

Biological Sciences
Drafting*
Engineering*
Mathematics
Physical Sciences
Geosciences-GIS

Mission

The mission of the Division of Mathematics, Science and Engineering is to provide our students, through basic skills, nontransferable, and transferable collegiate curricula, the skills and knowledge that will enable them to be life long learners able to function qualitatively and quantitatively in the physical and biological world in which we live. As part of a dynamic college with a very diverse curriculum, we strive to prepare our students to be adaptable to changes in their future personal activities and transformations in local, regional, national and global marketplaces.

Through a continuous reassessment of the College's Institutional Learning Outcomes, we strive to achieve our course and programmatic learning objectives. Moreover, student achievement will be measured through an assessment of Student and Program Learning Outcomes (SLOs and PLOs). The Division is actively involved and close to completion of the preparation of both SLOs and PLOs and the means for their assessment.

The Division last conducted Program Review in Fall Semester 1998 and since that time Antelope Valley College (AVC) has experienced:

- an increase in general student enrollment with more than 13,000 students enrolled during the Fall 2007 Semester and unduplicated head counts suggesting up to 20,000 students may be served on an annual basis,
- an increase in the numbers of Full-time and Adjunct Faculty members to meet the increased student instructional demand,
- a major functional reorganization with changes and increases in administrative personnel,
- the hiring of classified staff to meet the increased work demands associated with growth in student numbers,
- the start of an ambitious, transformational construction program funded in part by a \$139 million general obligation bond passed by District voters,
- an increase in student activities and programs supported through private and federally funded grants, and
- the completion of an Accreditation Cycle.

The Division has enthusiastically participated in the growth of the college over the past nine years.

- The Division responded to student needs by increasing the numbers of sections taught from 520 in 2000-01 to 850 in 2006-07 (Table 1). So far, for the 2007-08 academic year, 479 sections have been taught during the Summer Session and Fall Semester.

Table 1. Numbers of course sections taught in Mathematics, Science and Engineering from Fall Semester 1999 - Fall Semester 2007.

Years	Summer	Fall	Interession	Spring	Total
1999-2000		202		215	417
2000-2001	66	217	3	234	520
2001-2002	78	252	6	258	594
2002-2003	89	268	18	249	624
2003-2004	66	266	20	277	629
2004-2005	97	296	44	307	744
2005-2006	100	316		316	732
2006-2007	120	336	48	346	850
2007-2008	119	360			

- To meet the instructional needs of the division, the teaching faculty expanded from 26 full-time and 52 adjunct faculty members in 2001-02 to 40 full-time and 69 adjunct faculty members in 2007-08. An additional four new full-time faculty positions have been identified for recruitment during the Spring 08 Semester.
- To meet the administrative and instructional support requirements of this type of programmatic expansion, classified support has increased from 1 administrative support person and 4 laboratory technicians in 2003 to 1.5 administrative, 4 laboratory technicians, 1 computer technician and 1 Math Instructional Aid in 2007. It should be noted that although the increase in classified personnel is greatly appreciated and provides for more effective operation of the division, this level of support does not fully meet the division's needs. There is a need for another laboratory technician able to support the late afternoon/evening course offerings.
- In 2002-03, the Mathematics and Science Division taught 22 percent of the 8,148.1 full-time equivalent students (FTES) taught by all college divisions teaching over 25 FTES (Table 2). By 2006-07, this proportion had increased to 24.1 percent of 9,144.1 FTES taught. As indicated, these statistics are based on divisions teaching over 25 FTES and do not include positive attendance for Interession and Summer Sessions. The College as a whole increased by 996 FTES and this division contributed 410 FTES or 41.2 percent of this increase. The increase is in part linked to the addition of Engineering and Engineering Technology Programs to the Division in Fall Semester 2006; however, the majority of this increase is due to the increased demand for basic skills mathematics and

non-majors General Biology. This latter relationship will be documented in the discipline evaluations.

Table 2. Comparison of Fulltime Equivalent Students at AVC in Divisions with more than 25 FTES from 2002-03 to 2006-07.

Division	Academic Year									
	2002-03	Percent	2003-04	Percent	2004-05	Percent	2005-06	Percent	2006-07	Percent
HD	48.6	0.6	36.5	0.4	42.3	0.5	44.7	0.5	49.0	0.5
NCR	114.1	1.4	107.1	1.3	118.1	1.4	54.6	0.6	51.1	0.6
TEC	576.5	7.1	664.0	8.0	684.0	7.9	647.7	7.6	572.1	6.3
IR	5.9	0.1	265.6	3.2	523.7	6.0	532.6	6.3	634.4	6.9
PE	930.6	11.4	720.5	8.7	709.0	8.2	694.3	8.1	730.2	8.0
BUS	902.4	11.1	1141.4	13.7	1108.6	12.7	973.1	11.4	780.4	8.5
VAPA	1261.3	15.5	911.6	11.0	848.6	9.8	764.2	9.0	1078.6	11.8
LA	1073.1	13.2	1124.1	13.5	1158.8	13.3	1286.4	15.1	1324.6	14.5
SS	1444.0	17.7	1461.9	17.6	1544.9	17.8	1551.3	18.2	1722.0	18.8
MS	1791.5	22.0	1874.6	22.6	1957.7	22.5	1970.9	23.1	2201.6	24.1
Totals	8148.1	100.0	8307.2	100.0	8695.9	100.0	8519.6	100.0	9144.1	100.0

Student Learning Outcomes

Course Objectives have been revised clearly defined in measurable terms in each Course Outline of Record and the faculty is working to clearly define Student course (SLO) and Programmatic Learning Outcomes (PLO) that reflect not only the course objectives but a measure of overall student learning as a result of their classroom and laboratory activities and interactions with faculty teaching. In addition, the measurable SLOs will align with the Institutional Learning Outcomes (ILOs) and reflect overall institutional effectiveness in the educational process. We strive to determine our effectiveness through continuous reassessment of course objectives and SLOs. This will be an integral component of future program Reviews.

Degrees and Certificates Awarded

The Division of Mathematics, Science and Engineering provides instruction a wide variety of courses that fulfill Associate Degree requirements and the Intersegmental General Education Transfer Curriculum (IGETC) and General Education Requirements for the California State University. The degrees, certificates and local certificate offered through the division are presented in Table 3.

Table 3. Programs of Study	Degree	Certificate
Biological Sciences	X	
Drafting/Computer Aided Design	X	X
Engineering Technology	X	X
Mathematics	X	
Physical Science	X	
Geographic Information Systems (GIS)		X (local)

As part of this Systematic Program Review only those courses of study linked to Associates Degrees in the Biological Science, Mathematics and Physical Science plus the local Certificate in Geographic Information Systems (GIS) will be addressed. The Engineering* and Drafting* degrees and certificates will not be included as they were part of the Program Review in Technical Education that was completed less than two years ago.

Program: Biological Sciences

Table 4. Courses and Number of Sections Taught in the Biological Sciences from 2000-01 to 2006-07.

COURSE	ACADEMIC YEAR						
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06*	2006-07
BIOL 100 Elem Anatomy & Physiology	3	3	5	4	4	3	4
BIOL 100L Elem Anatomy & Physiology Lab.	7	8	9	8	8	7	9
BIOL 101 General Biology	19	21	21	22	26	23	26
BIOL 101L General Biology Laboratory	45	49	55	56	64	61	66
BIOL 102 Human Biology		2	1	2	2	2	3
BIOL 102L Human Biology Lab.		2	1	2	2	2	3
BIOL 104 Environmental Biology	3	2	3	4	3	5	5
BIOL 110 Biology for Sci. Majors	1	2	2	2	2	2	2
BIOL 110 SA Biology for Sci. Majors	2	2	2	2	2	2	2
BIOL 110L Biology for Sci. Majors Lab.	1	3	3	3	3	3	3
BIOL 120 Biology for Sci. Majors	1	2	2	2	2	2	2
BIOL 120 SA Biology for Sci. Majors	1	3	2	2	2	2	2
BIOL 120L Biology for Sci. Majors Lab.	2	2	3	3	3	3	3
BIOL 160 Birds of Southern California							
BIOL 170 Tropical Biology			1		1		
BIOL 201 General Human Anatomy	5	5	5	5	6	8	8
BIOL 201L General Human Anatomy Lab.	10	11	10	12	16	14	16
BIOL 202 General Human Physiology	4	5	4	4	4	4	5
BIOL 202L General Human Physiology Lab.	8	8	8	8	8	8	9
BIOL 204 General Microbiology	4	4	6	6	7	7	9
BIOL 204L General Microbiology Lab.	7	8	10	10	13	12	16

BIOL 205 Introduction to Biotechnology
BIOL 205L Introduction to Biotechnology Lab.

Totals	123	142	153	157	178	170	193
---------------	------------	------------	------------	------------	------------	------------	------------

*No Intersession.

Area 1: CURRICULUM

Course Development

1.1 The curriculum supports the educational objectives of the program/discipline. New and revised courses address changes in the discipline or industry specifically address student needs.

In developing new courses our faculty research courses offered at other colleges and also take into consideration the educational needs of our student population. When the need for a new course is identified, our faculty members bring the topic to one of our regular Division meetings where the topic is discussed and approved. After a new course is developed, it is reviewed and approved by the dean and by the division faculty during one of our regular meetings. Working with the divisional Academic Policies and Procedures Science Representative, the faculty member involved in developing the new course presents the course to the Academic Policies and Procedures committee for approval.

Current courses offerings (Table 4) satisfy the vocational and transfer needs of non-major and majors students in health care career fields and general education. Three new courses were developed since the last program Review. BIOLOGY 102, Human Biology, was developed in response to the needs of students transferring in the Social Sciences. While BIOLOGY 205, Introduction to Biotechnology, and BIOLOGY 205L, Introduction to Biotechnology Laboratory were developed in response to perceived interests of students due to the increased visibility of biotechnology in crime investigation, modern biology, agriculture and medicine. Human Biology is a 4 unit course with 3 hours of lab a week. It is an introductory, transfer course intended for non-science majors wanting to expand their knowledge of biology with focus on the human body. The courses in biotechnology were designed to introduce the student to theoretical and applied concepts, areas of research and development, and career opportunities. Biology 201 and 202 meet the needs of transfer students in the biological sciences and our associate degree program in registered nursing and the newly added Respiratory Therapy program. Since 1995, instructors of Biology 201 have offered an Honors Option, involving additional study, as part of the Honors Transfer Program. An Honors Option for Biology 202 is being considered.

In an effort to increase student access, BIOL 101, General Biology, and BIOL 204, General Microbiology, have been approved by the Academic Policies and Procedures Committee (AP&P) for Technology Mediated Instruction (TMI). Instructor designed lectures including many graphics and animations are presented online through Blackboard while examinations and laboratory sessions are held on campus. This hybrid approach is being considered for other courses including BIOL 202, General Human Physiology submitted for consideration by AP&P

during the Fall 07 Semester. This latter course, however, will also include online presentations of student laboratory exercises with all student testing taking place on campus. Finally, because of the wide spread use of MRIs and CAT scans in medical diagnosis, a course in cross-sectional human anatomy is being considered in support of the new Radiological Technician program starting in the Fall 2008 Semester.

Course content has kept pace with advances in these sciences by regular replacement and upgrading of course materials, methods and some laboratory equipment in keeping with trends in the field.

Student Learning Outcomes (SLOs) were understudy by the Biology faculty during the Fall Semester 2007 as a function of several divisional meetings and a workshop conducted by Dr. Patrice Gouveia-Marks , Co-chair Student Learning Outcomes Committee. During the following Spring Semester 2008 , the faculty reflected upon the learning objectives of their courses and developed SLOs and assessment tools. As well, the role of SLOs, PLOs and Institutional ILOs were discussed and emphasized in the context of future Program Reviews and Accreditation Self-studies.

Course Revision

1.2 All courses reviewed within a six-year cycle per Title 5, section 55210(b)(3).

All biological sciences courses are being reviewed on a regular basis and revised as necessary.

During the last three years we have updated the following courses:

1. BIOL 100 formerly BIOL 100 & BIOL 100L (Elementary Human Anatomy and Physiology & Elementary Human Anatomy and Physiology Lab)
2. BIOL 101 formerly BIOL 101 & BIOL 101L (General Biology & General Biology Lab)
3. BIOL 102 formerly BIOL 102 & BIOL 102L (Human Biology & Human Biology Lab)
4. BIOL 104 (Environmental Biology)
5. BIOL 110 formerly BIOL 110, BIOL 110L & BIOL 110SAS (General Molecular Cell Biology)
6. BIOL 120 formerly BIOL 120, BIOL 120L & BIOL 120SAS (General Organismal, Ecological, and Evolutionary Biology)
7. BIOL 170 (Tropical Biology)
8. BIOL 201 formerly BIOL 201 & BIOL 201L (General Human Anatomy & General Human Anatomy Lab)
9. BIOL 202 formerly BIOL 202 & BIOL 202L (General Human Physiology & General Human Physiology Lab)
10. BIOL 204 formerly BIOL 204 & BIOL 204L (General Microbiology & General Microbiology Lab)
11. BIOL 205 (Introduction to Biotechnology)

12. BIOL 205L (Introduction to Biotechnology Laboratory)

In all instances the Learning Objectives were revised using Bloom's Taxonomy and expressed in measurable terms. Those courses formerly listed as separate lectures and labs were also reclassified as lecture only courses because 60 percent of instruction in the laboratory was in lecture format.

Our faculty makes sure that the courses we offer cover the needs of the wide spectrum of students we have. We make sure that we offer all freshman and sophomore transfer courses in biology, microbiology, anatomy, and physiology and all of their prerequisites, and all courses needed for the Associate Degree.

Our faculty maintains currency in biological sciences content by attending conferences, taking classes, and using computer technology to enhance the teaching and learning of biological sciences.

Other Curriculum Matters:

1.3 Courses which have not been taught within a three-year academic period are obsolete and have been removed from the college catalog. Courses which have not been taught within a two-year academic period are inactive and have been identified.

Obsolete courses:

BIOL 160 (Birds of Southern California) is obsolete due to low student demand.

BIOL 205 (Introduction to Biotechnology) and BIOL 205L (Introduction to Biotechnology Lab) are obsolete because they have never been taught due to low student demand.

Inactive courses:

BIOL 170 (Tropical Biology) was taught in Summer Sessions in 2002 and 2004 with trips to Australia and Kenya, respectively. The course was inactive until the Fall Semester 2007 when it was placed into the Summer Session 2008 Schedule. The course will be conducted in tropical Northern Argentina.

1.4 Where appropriate, courses address issues related to diversity and/or multicultural perspectives.

The wide range of biological sciences courses offered make it possible for students from diverse backgrounds to find the courses that are appropriate for their educational level and interest and to take part in programs offered at AVC such as nursing and science. The material in our courses describes real life situations and addresses the genetic diversity that is revealed in the diversity of life on our planet. The names of organisms, structures and functions in all life systems have their origins in Anglo, Latin, Asian, African, and other word roots. The pictures and photographs in the textbooks we use contain people of all genders, all races and ages, some handicapped, without showing any discrimination against any particular segment of the population.

1.5 New programs developed during the period under review meet students' needs are consistent with the college mission and ILOs.

No new programs of study were developed during the period of review.

1.6 Existing programs are revised as needed.

During the last three years we have updated all of our courses. Course content was re-evaluated and Learning Objectives were rewritten in measurable terms using Bloom's Taxonomy. As well, following training during the Fall 2007 Semester, SLOs have been written for all biology courses and should be finalized during the Spring Semester 2008. Program Learning Outcomes are under consideration at this time.

1.7 Courses are taught within the parameters described in the outline of record.

Our faculty members match the Course Outline of Record (COR) with the material in the textbooks currently in use, section by section. Upon hiring all faculty are provided with the CORs of their assigned courses and full-time instructors make every effort to communicate the importance of covering the material as described in the COR to the part-time faculty. Full-time faculty members perform peer evaluations of both full-time and adjunct faculty. During the evaluation process we review our peers' syllabi to make sure they are within the parameters described in the COR.

1.8 Faculty and staff use innovative strategies to meet student needs and staff development supports the development of these strategies.

Our faculty and staff use a variety of innovative strategies to meet the needs of our students. In addition to traditional lecture faculty have use Supplemental Instruction, collaborative learning, technology to enhance teaching and learning, online teaching, web based supportive information, and assigned individual and group projects. Online courses and courses that are taught using technology satisfy our students' needs. The use of modern technology has greatly enhanced student learning in the last three years and it appears to have contributed to a higher success rate among our students.

Antelope Valley College offers a multitude of opportunities for staff development through flex activities, on-campus workshops and seminars, as well as by offering compensation for attending workshops and classes' off-campus, for example, the annual Tech Ed conference.

Numerous instructional innovations have been adopted by our expanded faculty in recent years. Multimedia projection systems are present in all biology laboratories and in the anatomy and physiology courses, we have a growing inventory of anatomical specimens and support equipment and our students now use a wide array of learning tools. The faculty has been developing online instruction and has produced customized learning materials including lecture and laboratory guides, manuals and audio and video CDs. In 2004, older laboratory devices and computers were upgraded with multitask computerized equipment to enhance data collection in physiology. In the last few years our department has acquired a new digital still camera, a digital video presenter and a HD video camera for better preparation and classroom presentation. New

LCD televisions and a new LCD projection system in our lab have made delivery of PowerPoint outlines easier and more effective. Classified staff from the Instructional Multimedia Center has been very supportive of all our efforts to utilize emerging technologies, including the introduction of Pod casting for sections of BIOL 201 and 202. It should be noted that the students were very receptive to this technology and have expressed great concern when the server has been down. It is very clear that Pod casting of audio and video materials is the wave of the future. In 2007, a new Computer Technician was added to the divisional staff that has helped outfit and upgrade our labs, offices and lecture rooms as well as manage and troubleshoot computer issues throughout the division. There is however a need to for additional technical support in support of evening and Saturday sections.

Scheduling

	2003-04		2004-05		2005-06		2006-07	
	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
FTES	271.9	271.7	279.7	276.9	280.4	264.2	321.6	278.4
WSCH	8,397.4	8,391.2	8,638.4	8,551.0	8,658.0	8,157.6	9,931.6	N/A
Enrollment	2,554.0	2,501.0	2,563.0	2,547.0	2,600.0	2,444.0	2,818.0	N/A
FTEF	8.8	8.9	9.1	9.1	13.5	13.3	11.4	N/A

1.9 Course scheduling provides students with reasonable access to meet their educational objectives and promotes strong enrollment patterns.

Our course scheduling contributes to strong enrollment. As revealed in Table 5, full-time equivalent students (FTES) enrolled in courses in the biological sciences have increased from 271.9 in the Fall Semester 2003 to 321.6 in the Fall Semester in 2006. Courses are offered at many different time slots and at various options, such as one day, two days, three days or four days per week. Classes that are in great demand are offered mornings, afternoons, evenings, and nights. We also offer Friday and Saturday classes to accommodate our working students and the students who have family obligations. As an alternative to traditional instruction, we also offer convenient online classes. As indicated in Table 4, the number of sections taught in the biological sciences has increased from 123 in 2000-01 to 193 sections in 2006-07. The greatest contributor to this increase resides in the offerings of BIOL 101, General Biology, a non-majors general education course. From 2000-01 to 2006-07, the number of lecture sections taught has increased from 19 to 26 and the 24 seat lab sections have increased from 45 to 66, respectively. In 2006-07, approximately 1585 students enrolled in this course and our ability to accommodate additional students is approaching capacity. It should be noted that many of these students are aspirants to the vocational nursing program and as such considerable student demand has also been placed on BIOL 201, 202 and 204.

Enrollment patterns in this subprogram closely follow incentives and employment opportunities for Registered and Licensed Vocational Nurses and other health care providers in the community and state. During the period under review, student demand for anatomy and physiology courses has grown tremendously. Classes are now offered from 7:45 A.M. to 10:00 P.M., Monday

through Friday and 8:00 A.M. to 2:00 P.M. on Saturday. Limited by available laboratory space, the anatomy and physiology subprogram is enrolled to capacity. More students could be served if additional laboratory and lecture space were available and the application of some online offerings. A new, 105,000 square foot Health and Science building is now being designed with initial construction possibly slated for Fall Semester of 2009, it will alleviate overcrowding and limited access throughout our division and certainly will allow for expansion of anatomy and physiology. It is also noteworthy that BIOL 202, General Human Physiology, has been approved for online presentation and will include an online laboratory section. This hybrid course will provide for additional student access.

Course and Program Support

1.10 Faculty and staff are familiar with and work closely with other Student Services and Academic Affairs faculty and staff in program development and student referral.

Faculty and staff work closely with other Academic Divisions to ensure that we offer courses needed to satisfy the educational needs of our students. As well, the faculty works to provide our students with the resources to be successful.

The Biological sciences faculty works well with the Admissions and Records Office. We often refer students to Admissions and Records for a late enrollment, or change in schedule. The faculty members provide the Admissions and Records Office with accurate census, attendance and grade records in a timely manner.

The Disabled Student Services Office is of great value to our program as it provides services to students with both physical as well as learning disabilities. For example, the DSS office provides interpreters for our deaf students, helpers for the blind, and a quiet place for testing for students identified with special needs that need extra time to complete their tests.

The Learning Center also contributes immensely to the success of our students by providing tutoring, Supplemental Instruction, Reading Lab, Writing Center, ESL Support and a Math Center. Supplemental Instruction has proven to be very helpful for students in the biological sciences courses.

The Library also contributes to our students' success by providing textbooks placed on reference, and a multitude of learning resources.

The Transfer Center provides great help to our students as they complete their education at AVC and prepare to transfer to a four-year college.

1.11 Recent development in instructional technology have been incorporated into courses and student support services consistent with the objectives of the program and services.

Online classes provide students with a convenient way to learn and complete their classes successfully. The biological sciences offered the division's first online hybrid course in 2004, General Microbiology (BIOL 204). The lecture component of the course is available online while the laboratory and examinations are completed on campus. This format has been followed by General Biology, BIOL 101, and General Human Physiology, BIOL 202. However in the latter instance, the laboratory will also be taught online.

See also section 1.8.

Articulation

1.12 Courses are articulated with institutions of higher education and local high schools.

Our courses are articulated with the University of California (UC) and the California State University (CSU). Only BIOL 100 (Elementary Human Anatomy and Physiology) is non-transferable. Human Biology, BIOL 102, a transferable course which evolved from BIOL 100 a course taken by Licensed Vocational Nursing students. We also articulate our courses with the Antelope Valley Union High School District and students in the Medical Academy in the Regional Occupational Program.

The Dean forms faculty committees that are very active in successful articulation of our courses. All these efforts help in the smooth transition of students from High School to AVC and from AVC to a four-year college.

1.13 The course and/or program meet one or more of the primary goals articulated in the College Mission Statement.

The courses of the Biological Sciences Program support the primary objectives of the college which are to fulfill transfer, associate degree and vocational educational requirements.

1.14 The courses and/or program meet one or more of the college's ILOs.

Every course offered by the Biological Sciences Program meets one or more of the college's Institutional Learning Outcomes. Some courses satisfy general education requirements, while others satisfy general education requirements and, in addition, they are transferable to UC, CSU or both systems.

1.15 The courses and/or program are consistent with plans articulated in the Educational Master Plan.

The Biological Sciences Program offers a wide variety of courses that fulfill many Associate Degree requirements, Certificate requirements, as well as prepare students for transferring to a four-year college.

Area 2: STUDENT SUPPORT AND DEVELOPMENT

Not Applicable

Area 3: PROGRAM AND STUDENT LEARNING OUTCOMES

3.1 Expectations for PLOs and SLOs are clearly articulated and actual student learning outcomes are used in the assessment of course and program effectiveness.

Student learning objectives are clearly articulated in the Course Outline of Record and syllabi for courses within the Biological Sciences Program. Assessments are currently based upon achieving these course learning objectives. However, at the conclusion of the current course revision cycle, all courses will be using measurable terms to assess these objectives and will have properly articulated student learning outcomes (SLOs) and program learning outcomes (PLOs) identified. As well, methods for the assessment of SLOs and PLOs will be identified.

Briefly describe the trends and patterns revealed by those methods.

The division continues to gather data which will accurately demonstrate the success or otherwise of students in the biological sciences courses as designed. The Office of Institutional Research and Planning is assisting in this ongoing study, to ensure that prerequisites are ensuring success in later classes and that course articulations and student success are measurable. With the identification of measurable SLOs and PLOs, the faculty responsible for the courses in the biological sciences will be able to make decisions concerning modifications to their courses based on quantitative data and maintain programmatic and institutional effectiveness. Moreover, assessment/ evaluation contributory to program review will be made on a semester and annual basis.

3.2 Student evaluations are an integral part of the assessment of course and program effectiveness.

Summarize the results of the student program evaluation procedure.

The student program evaluation procedure is an integral part of the Biology area's evaluation process. Each semester faculty conduct student evaluations and instructors use the information as a means of evaluation for course design and program area effectiveness in serving student needs. The Student Survey for Systematic Program Review has been handed out in the two past semesters (Spring 2007 and Fall 2007) to provide the most relevant information possible. Results of this survey are presented in Table 6. Students have consistently requested more Anatomy classes to allow them to be able to take the series of 200 level classes (BIOL 201, BIOL 202 and BIOL 204) in the order indicated, which is most likely to ensure success and the higher grades needed to allow successful application to the nursing program, one of the major career areas into which our students proceed. Until additional classrooms are provided, this is not possible.

Table 6. Student Survey Fall 2007 Biological Sciences

Question		Biology	%	Anatomy	%	Phys	%	Micro	%	Totals	%
2: Gender	Male	83	23%	0	0%	2	20%	7	13%	92	21%
	Female	279	77%	12	100%	8	80%	47	87%	346	79%
										438	
3: Age	15-17	7	3%	0	0%	0	0%	0	0%	7	2%
	18-20	104	40%	4	33%	1	10%	1	14%	110	38%
	21-24	63	24%	4	33%	2	20%	2	29%	71	24%

	25-30	43	16%	1	8%	4	40%	1	14%	49	17%
	31-39	23	9%	2	17%	0	0%	1	14%	26	9%
	40-49	17	6%	1	8%	3	30%	2	29%	23	8%
	50-59	5	2%	0	0%	0	0%	0	0%	5	2%
	60+	0	0%	0	0%	0	0%	0	0%	0	0%
										291	100%
4: Ed Goal	Trnsf w/ AA/AS	165	63%	7	58%	4	40%	4	57%	180	62%
	Trnf w/o AA/AS	27	10%	1	8%	0	0%	0	0%	28	10%
	AA/AS only	42	16%	3	25%	5	50%	3	43%	53	18%
	Voc Cert	5	2%	1	8%	0	0%	0	0%	6	2%
	Interest	4	2%	0	0%	0	0%	0	0%	4	1%
	Skills	1	0%	0	0%	0	0%	0	0%	1	0%
	Lice/Cert	9	3%	0	0%	0	0%	0	0%	9	3%
	Ed dev/BS	0	0%	0	0%	0	0%	0	0%	0	0%
	HS credit	0	0%	0	0%	0	0%	0	0%	0	0%
	Undecided	7	3%	0	0%	1	10%	0	0%	8	3%
										289	100%
5: Race	AN/AI	4	1%	0	0%	0	0%	0	0%	4	1%
	AA/PI	23	7%	3	25%	1	10%	3	5%	30	7%
	B/AA	48	14%	1	8%	0	0%	7	12%	56	13%
	H	100	28%	2	17%	3	30%	17	28%	122	28%
	W/C	153	44%	5	42%	6	60%	25	42%	189	44%
	Other	23	7%	1	8%	0	0%	8	13%	32	7%
										433	100%
6: #courses	1-2	188	53%	3	25%	1	10%	20	45%	212	50%
	3-5	119	33%	8	67%	4	40%	12	27%	143	34%
	6-10	33	9%	1	8%	3	30%	9	20%	46	11%
	11+	16	4%	0	0%	2	20%	3	7%	21	5%
										422	100%
7: Status	FT	171	48%	4	33%	1	10%	19	35%	195	45%
	PT	183	52%	8	67%	9	90%	35	65%	235	55%
										430	100%
	SA	175	49%	5	42%	7	78%	22	42%	209	48%
	A	163	46%	6	50%	2	22%	29	55%	200	46%
	D	11	3%	0	0%	0	0%	1	2%	12	3%
8: Course offerings meet my needs	SD	6	2%	1	8%	0	0%	0	0%	7	2%
	NA	3	1%	0	0%	0	0%	1	2%	4	1%
										432	100%
9: Requirements for crt.	SA	119	33%	4	33%	5	56%	13	24%	141	32%
	A	180	50%	7	58%	4	44%	31	57%	222	51%
	D	45	13%	1	8%	0	0%	8	15%	54	12%

programs or AA degree are clear and easy to understand	SD	6	2%	0	0%	0	0%	1	2%	7	2%
	NA	9	3%	0	0%	0	0%	1	2%	10	2%
										434	100%
10: Courses contribute personal and professional development	SA	122	34%	4	33%	5	56%	15	27%	146	34%
	A	181	51%	8	67%	4	44%	32	58%	225	52%
	D	35	10%	0	0%	0	0%	5	9%	40	9%
	SD	8	2%	0	0%	0	0%	1	2%	9	2%
	NA	11	3%	0	0%	0	0%	2	4%	13	3%
										433	100%
11: Courses are relevant and up to date	SA	173	48%	7	58%	6	67%	19	37%	205	48%
	A	163	46%	5	42%	3	33%	29	57%	200	47%
	D	15	4%	0	0%	0	0%	1	2%	16	4%
	SD	3	1%	0	0%	0	0%	0	0%	3	1%
	NA	3	1%	0	0%	0	0%	2	4%	5	1%
										429	100%
12: The programs prepares me for career/future education	SA	159	44%	4	33%	5	56%	23	41%	191	44%
	A	134	37%	7	58%	4	44%	28	50%	173	40%
	D	43	12%	1	8%	0	0%	2	4%	46	11%
	SD	11	3%	0	0%	0	0%	0	0%	11	3%
	NA	11	3%	0	0%	0	0%	3	5%	14	3%
										435	100%
13: Days and times of scheduled courses meet my needs.	SA	118	33%	5	42%	0	0%	11	20%	134	31%
	A	160	45%	6	50%	7	78%	24	44%	197	45%
	D	57	16%	1	8%	0	0%	15	27%	73	17%
	SD	20	6%	0	0%	2	22%	5	9%	27	6%
	NA	2	1%	0	0%	0	0%	0	0%	2	0%
										433	100%
14: Courses that I am interested are offered frequently enough	SA	51	14%	2	17%	1	11%	0	0%	54	13%
	A	163	46%	2	17%	4	44%	19	35%	188	44%
	D	86	24%	7	58%	2	22%	26	47%	121	28%
	SD	47	13%	1	8%	2	22%	10	18%	60	14%
	NA	5	1%	0	0%	0	0%	0	0%	5	1%
										428	100%
15: Classrooms meet my needs	SA	150	42%	4	33%	3	38%	22	41%	179	41%
	A	176	49%	8	67%	4	50%	31	57%	219	51%
	D	24	7%	0	0%	1	13%	1	2%	26	6%
	SD	5	1%	0	0%	0	0%	0	0%	5	1%
	NA	3	1%	0	0%	0	0%	0	0%	3	1%
										432	100%

16: Computer labs meet my needs	SA	120	34%	4	33%	2	22%	23	43%	149	35%
	A	151	43%	3	25%	3	33%	27	51%	184	43%
	D	17	5%	1	8%	1	11%	0	0%	19	4%
	SD	4	1%	0	0%	0	0%	0	0%	4	1%
	NA	63	18%	4	33%	3	33%	3	6%	73	17%
										429	100%
17: Equipment and materials meet my needs	SA	136	38%	3	25%	2	22%	24	44%	165	38%
	A	196	55%	9	75%	6	67%	29	54%	240	56%
	D	16	4%	0	0%	1	11%	1	2%	18	4%
	SD	1	0%	0	0%	0	0%	0	0%	1	0%
	NA	7	2%	0	0%	0	0%	0	0%	7	2%
										431	100%
18: Promotion by instructors regarding educational and career opportunities meets my needs	SA	128	36%	3	25%	3	33%	6	11%	140	33%
	A	168	48%	9	75%	5	56%	40	75%	222	52%
	D	27	8%	0	0%	0	0%	4	8%	31	7%
	SD	7	2%	0	0%	0	0%	1	2%	8	2%
	NA	23	7%	0	0%	1	11%	2	4%	26	6%
										427	100%
19: Program support staff are helpful and courteous	SA	105	30%	3	25%	1	11%	16	30%	125	29%
	A	169	48%	7	58%	4	44%	31	58%	211	49%
	D	25	7%	1	8%	0	0%	6	11%	32	7%
	SD	7	2%	0	0%	0	0%	0	0%	7	2%
	NA	48	14%	1	8%	4	44%	0	0%	53	12%
										428	100%
20: Lab Techs are knowledgeable and courteous	SA	74	29%	2	17%	2	22%	1	14%	79	28%
	A	94	37%	6	50%	1	11%	3	43%	104	37%
	D	8	3%	0	0%	0	0%	0	0%	8	3%
	SD	2	1%	0	0%	1	11%	0	0%	3	1%
	NA	75	30%	4	33%	5	56%	3	43%	87	31%
										281	100%
21: There is adequate publicity about this program in the community	SA	82	23%	3	25%	1	11%	8	15%	94	22%
	A	155	44%	7	58%	4	44%	30	56%	196	45%
	D	71	20%	0	0%	1	11%	13	24%	85	20%
	SD	12	3%	1	8%	0	0%	1	2%	14	3%
	NA	36	10%	1	8%	3	33%	2	4%	42	10%
										431	100%

3.3 Job placement data are an integral part of the assessment of course and program effectiveness for vocational programs.

Not Applicable

Area 4. PERSONNEL AND SUPPORT SERVICES

4.1 The ratio of full-time to part-time faculty provides students with a quality of instruction consistent with student needs and goals of the program.

There are presently 10 full-time faculty members and 12 part-time faculty members of the Biological Science teaching area. During the Fall Semester 2007, a total of 303 Lecture Hour Equivalents (LHE) was taught and the ratio of full-time / part-time faculty instruction was 156/147 (1.06:1). This lies well below the 75/25 (3:1) ratio suggested by the community college chancellor's office and reflects full-time faculty teaching overload. It does allow for a quality of instruction consistent with student needs and goals of the program. It has been increasingly difficult to recruit qualified part-time faculty. With additional facilities, the Biological Sciences program could potentially expand and offer more courses and class sections. With existing facilities at this time most lecture and laboratory facilities are being used at maximal capacity. Students, however, consistently request additional sections of Human Anatomy and Human Physiology. Since 2004, the anatomy and physiology courses have been taught by 4-5 full time and 1-2 adjunct instructors.

4.2 The ratio of full-time to part-time faculty provides adequate personnel responsible for program evaluation and revision.

Student evaluations are conducted by all instructors every semester to monitor their performance in class and as an ongoing assessment of content. Results have been useful and largely positive. Every course in the biology program and presently being offered has at least one full-time faculty member teaching the course. This allows for adequate and regular program evaluation and revision.

Twice annually, the full-time faculty meets with part-time faculty for cursory program review and exchange of ideas. Texts, media, resources and equipment needs are discussed and appraised. Full-time faculty volunteers for evaluation of adjunct staff and work within the formats established by the Tenure and Evaluation Committee.

4.3 There are adequate full-time faculty and staff to meet program needs.

Because of increasing enrollment and difficulties in hiring qualified adjunct faculty, the need for additional full-time instructors in general biology, anatomy and physiology, and microbiology has been identified and given a high priority by the college administration.

4.4 There is adequate support staff to meet program needs.

Divisional classified staff including laboratory and computer technicians help support faculty efforts by making sure that the computers, projectors, copiers, and printers are working properly, arranging faculty meetings, notifying faculty by e-mail, ordering textbooks and supplies, and making classroom arrangements. With respect to the support of the computer technology, the computer technician to support faculty has been greatly limited by the restrictive policies of Informational Technology Services. Student assistants provide extremely valuable assistance to the laboratory technicians in support of instruction. Supplemental Instructors work through the Learning Center helping the students who need extra help with course content in these demanding classes.

Two Laboratory Technicians are currently shared by the 22 full-time and part-time faculty members who deliver the instructional program in the biological sciences. The needs of these courses are diverse and require technical attention during day, evening and weekend hours. On a daily basis the workload could be spread over hours extending from 7:30 A.M. to 10:00 P.M. straining the ability of the support staff to be responsive to all requests during a regular workday. They are only able to keep up with the weekly work and have no time for special projects that could improve the appearance or performance of the laboratories or help upgrade the quality of instruction. Qualified student aids, requiring supervision, are difficult to find and train. It is very evident an additional laboratory technician is needed to cover the needs of the biology program, especially in the evening and Saturday hours.

Because the technical staff work so closely with faculty, it is important that hiring committees for support staff include a diverse faculty representation. Although committees will become larger, this will assure the new employee has the requisite skills for the position and the needs of the classrooms.

For years, the custodial staff has been able to do only a cursory cleaning of the biology laboratories and lecture halls. Nightly, they are able to only empty trash baskets and erase the boards. Cleaning of sinks, counters, windows and doors are never done. In lecture rooms, desks are left marked with graffiti and soda spills overlooked. The outside walls of classrooms are never washed and remain stained with gum, shoe marks and beverage spills. More custodians would permit them to spend more time on these unsightly and unsanitary conditions that clearly have a negative impact on student comfort, satisfaction and hence learning.

4.5 There are adequate staff development opportunities to enhance the effectiveness of all staff in meeting the goals and objectives of the program as well as the professional development of the staff.

There are somewhat adequate staff development opportunities to enhance the effectiveness of all staff in meeting the goals and objectives of the biological sciences program as well as the professional development of the staff. Faculty has attended the Tech Ed conference where the latest in instructional technology is unveiled and national meetings of professional organizations linked to the biological sciences. The technical staff has attended safety workshops linked to CalOSHA standards for laboratory health and safety.

Briefly describe the professional development of the faculty and staff during the period under review, including staff development, flex sabbatical leaves, publications, honors, etc. What can the college do to enhance the effectiveness of faculty professional development?

Division faculty attend conferences in their subject areas, pursue research interests (such as environmental and ecological impact studies) during approved sabbatical leaves and subscribe to societies which regularly publish updated information pertinent to the areas of teaching in which these faculty are involved. Some faculty members become involved in maintaining teaching excellence by engaging in review writing, textbook research and development of innovative teaching ancillaries.

The college could enhance the effectiveness of faculty professional development.

All faculty of this discipline are active in professional organizations and attend national conferences and workshops as possible. Staff Development travel allowances per person are \$1000 annually and allow full-time instructors to attend at least one national conference each year.

Faculty members have been very resourceful in desktop publishing and have produced over a dozen custom publications for use in BIOL 100, 101, 110, 120, 201, 202 and 204. Custom videos and multimedia programs have also been developed or adapted for lab and lecture instruction. Many of these electronic documents have also been adapted for online instruction. Pod Casting has been initiated and proven quite popular. Students can conveniently access weekly lecture audio and PowerPoint slides via iTunes at no cost and have found this form of instructional technology convenient and valuable. It is apparent the college should encourage expansion of this technology to other disciplines.

4.6 Full-time faculty members are actively involved in the process of hiring and evaluating instructors.

All hiring and evaluation of instructors is in accordance with the college's Hiring and Tenure and Evaluation Policies and involves the dean and full-time faculty. New full-time tenure track faculty is evaluated over an initial four year period while new part-time faculty is evaluated the first semester of hire. After tenure is acquired and after a favorable first evaluation as a part-time instructor Faculty are evaluated on a three-year cycle, which is feasible and appropriate. Student and peer comments are encouraged and often lead to improvements in instruction or policy.

Hiring committees for new instructors have been properly composed of faculty directly affiliated with the specific area in the biological sciences.

4.7 The evaluation of staff is systematic and conducted at appropriate intervals. Follow-up to evaluation is timely and systematic.

Formal evaluation of the support technicians and Administrative Assistant are conducted by the dean on an annual basis according to District Policy. All faculty are provided the opportunity to contribute to the preparation of this document. Evaluation is done with the intent of

acknowledging the staff members effectiveness and encouraging improvement where necessary in particular areas.

4.8 The evaluation processes assess effectiveness and encourage improvement.

The tenure evaluation committee work closely along the excellent guidelines provided by the college chair in this area. The Biology area evaluation committees adhere closely to recommended procedures on all committees in which they are sitting members. The evaluation processes assess classroom effectiveness and encourage improvement.

Area 5: FACILITIES, EQUIPMENT, AND TECHNOLOGY

5.1 Facilities are appropriate for effective teaching, learning, counseling, and/or other services.

Lecture Halls 100 and 102 were remodeled and equipped with multimedia technology (computers, VCR, DVD players, and projectors) which provided the Biology program and campus in general, with a greatly improved setting for teaching. The students find the rooms more appealing and conducive to learning.

Currently we do not have enough classrooms for all biology classes at AVC and the number of biology classes is limited by the space available.

The Microbiology and Biology laboratories (rooms SC1 100, SC1 102, SC1 106) were greatly improved with the replacement of the rusted water pipes, installation of new flooring and the fresh coat of paint, and the installation of the cool/heat system. The student workstations were wired for computer data and video capabilities and some are in use; however, the majority has never been used. It was anticipated that computer technology would become more common placed in the biology laboratories but this has not become reality. At present however, the student seating is terrible and in need of replacement. Replacements have been requested in several annual budget requests.

Cosmetic repair and refinishing of the cabinetry in these laboratories would greatly enhance their appearance.

Anatomy, Physiology, and Human Biology are taught in one laboratory, room SC2 140. This room is aged, but well appointed, most being outfitted with white boards and computers, video/DVD players and updated projection systems. Space utilization and efficiency is exceptional and maximal. This laboratory is in use year round. Ideally, the two courses should be taught in separate laboratories. This would allow class scheduling, equipment storage, lab setup and breakdown to be indefinitely more simplistic. The division is in desperate need of additional Anatomy and Physiology laboratories to meet the growth and the demand of these courses for the programs in Nursing, Respiratory Therapy, and Radiological Technician. The new Health and Science building will alleviate currently cramped and limiting classroom conditions, but not until late 2011. In the meantime, suggestions have been made to share lab space with local high schools, utilization of a SOAR High School modular or lease of new modular buildings.

It is conceivable that additional Biology laboratory space at 15th Street East Palmdale campus would be appropriate to meet the need of our students and reduce the burden on the biology

laboratories on the Lancaster campus. This will provide access to students wishing to take classes at that location in the southern portion of our district and allow for the expansion of the degree applicable curriculum at this site.

It is safe to conclude that until the college completes the new Health and Science building the number of biology classes will be limited by the space available and will not meet the needs of our students.

For years it has been a desire to have an area on campus where native plants could be grown and displayed for instructional purposes. However, with pending campus construction plans there is no space on the Lancaster campus where native desert habitat is preserved for study.

An artificial pond has also been proposed for AVC acreage on the west side of the campus. This area would be used to bring students for wildlife viewing and fieldwork. This area needs to be designated as such in the College Master Plan. It is note worthy that such a site or proximity to such habitats is being entertained in the planning of the new 25th Street East Palmdale campus site.

5.2. Equipment and Technology are appropriate for effective teaching, learning, counseling, and/or other services.

In the general biology laboratories (SC1 102 and 106), fifty binocular Nikon compound microscopes, twenty stereo dissecting microscopes, two human skeletons, three Elmo document readers, and other teaching models were acquired for use in the biology courses. These replaced some antiquated monocular compound microscopes and dissecting microscopes and have greatly enhanced our course offering and the abilities for students to view biological specimens. Within these labs and the microbiology lab (SC1 100) there is a desperate need to provide safe comfortable student chairs.

Four new incubators, nine hot plates, seven electronic balances, two small incubators were purchased in the Microbiology laboratory and preparation room. This equipment is currently in use and has improved the maintenance of student cultures and the preparation of stock cultures and culture media. Equipment was also acquired through the generous support of the Central Coast Biotechnology Consortium.

One Spectronic spectrophotometer 20D+, one autoclave, EZ10, Tuttnaur, one centrifuge accuspin Micro, two incubators, two water baths, refrigerator/Freezer CFC-115V were purchased for use in Molecular and Cellular Biology laboratory. A laminar flow hood was installed in the preparation area in microbiology. This new addition provided for a safe setting and enabled the technician to inoculate cultures without fear of contamination, and the students to expose their cultures to the effect of ultraviolet light without danger. The biology preparation room is in need of a fume hood to protect the technicians when volatile or hazardous chemical solutions are being prepared.

Laboratory equipment in Anatomy and Physiology is falling behind technological advances due to insufficient funds for capital outlay in recent years. The microscopes are 25 years old. The laboratory computers are outdated and unable to run some new multimedia software. The bio-stimulators are over 30 years old and have become unreliable. The anatomical models receive heavy use and suffer from wear and age.

The 25 microscopes in the Microbiology laboratory are old and have received extremely heavy use by about 350 students per academic year. The objective lenses are damaged and the focusing mechanisms plus mechanical stages are showing their ages. They should be replaced by better resolution compound microscopes providing 1000x magnification. In addition, the laboratory needs two new incubators, a second autoclave, a holding water bath, and three new energy efficient two refrigerators to replace extremely old and noisy equipment. There is also need for an explosion proof refrigerator for use in the storage of volatile organic chemicals.

It should be noted that the research grade Leitz microscope, high resolution Sony monitor, and computer equipment to support the capture of still and video microscopic images are now outdated and not in use in the Microbiology laboratory. This valuable technology should be updated with a new high definition camera, hardware and software to enable the capture and preparation of digital images for use with PowerPoint presentations or other digital media including DVDs.

A water distillation system and ice machine were installed in the Biology laboratory. This equipment provided distilled water and ice for the preparation of student and other classroom chemicals and culture media.

Not only are funds limited or not available, the distribution of funds is often delayed or uncertain, making planning and prioritizing difficult.

5.3 Program support space is adequate to ensure the effective operation of the educational program and related support activities.

To accommodate the recent growth in the Mathematics, Science, and Engineering Division, additional offices in portable modular buildings (T300 and T500) were allocated to support new faculty. However, the biology faculty is dispersed all over campus in four buildings, making communication and exchange of ideas difficult. Given the large number of full time biology faculty (10), the work room in OF1 is in need of an additional computer.

The adjunct instructors (11) need a designated workroom, with computers, that will allow them to meet students for office hours and to prepare their instructional materials. Currently, adjunct instructors meet their students in the small workroom (OF1 101) where the space is very limited and shared with all divisional faculty: 40 full-time and 69 part-time instructors, a clerical assistant and equipment including a large copier, fax and Scantron Reader plus storage. This makes for a heavily used room and an environment that is not appropriate for learning.

The Divisional Office (OF1 103 and 104) are very small and the Divisional Administrative Assistant functions with very few amenities. One divisional clerical assistant works in the general workroom OF1 with a very limited space.

5.4 The safety of the facilities and equipment are reasonable and adequate.

The safety of the facilities and equipment are of number one priority and are constantly monitored. They are deemed reasonable and adequate considering the buildings are close to 50 years old. However, because of their age the potable water system often runs brown in color and desires to bring additional electrical equipment to the labs and offices require an audit of the

electrical load and the determination of adequate electrical power. Recently, because of the load placed on the system by new student hotplates exceeded the load capacity of the available circuits, only half the lab could prepare media at one time. To elevate this problem, a new circuit had to be added to the building and the conduit run on the exterior of the building. The Microbiology laboratory was equipped with a Laminar flow hood for bacterial transfers and the preparation of many chemical solutions.

Security telephones were recently installed in lecture halls LH 100, LH 102, and all the biology laboratories. These have been welcomed installations by providing the faculty and staff with an additional measure of security.

In general, the laboratories in the Biological Sciences provide a reasonable safe setting. However, several concerns have been expressed:

1. The disposal of stains in the Microbiology laboratory requires a large storage.
2. The refrigerators in the Microbiology laboratory are old and very noisy should be replaced and isolated from the laboratory work.
3. The storage of volatiles that require refrigeration, such as diethyl ether, should be in an explosion proof refrigerator.
4. Faculty and staff should be trained in CPR and have adequate safety equipment at their disposal.

The Math, Science, and Engineering building OF 1 was greatly improved with the installation of new flooring and the fresh coat of paint. Regardless, the biology faculty is anxiously awaiting the construction of the new Health and Sciences Building.

Area 6. FISCAL SUPPORT

6.1 During the period under review, resources have been used effectively to support programs and services.

In general during the period under review, resources have been adequate to effectively support programs and services in the biological sciences. Although amounts of capital outlay have not been excessive, major purchases, including microscopes and lcd projection systems, have been made when Instructional Block Grant funds were available. Computers used by instructors have been upgraded and General Fund supply budgets have been adequate for the purchase of classroom and laboratory instructional consumables. Only in the 2007-08 academic year has the biological science program expended their supply allotment before the end of the Fall 07 Semester and subsequently had to rely upon Proposition 20 funds for continued support. It appears that these increases in costs are linked to increasing enrollments and increases in vendor costs, for example cats for dissection are becoming difficult to purchase and much more costly. The purchase of supplies prior to the 2008 Summer Session may prove to be problematic.

With the increase in student enrollment at the college, there has been a compensatory increase in the administrative workload linked to instruction. The numbers of sections taught have increased from 123 in 2000-01 to 193 in 2006-07 (Table 4) and additional faculty, staff and student workers are needed to complete the biological sciences mission. A Clerical assistant II was hired

in support of the divisional office and student workers supported through Federal Work Study or District hourly funds have been a great help in support of the biology labs.

A new Health and Science Building is in the final stages of Design Development; however, before it is to be occupied, the biological sciences program and Microbiology and Anatomy and Physiology are in need of replacement microscopes. The present equipment is beyond the point of no return with respect to repair and simply are in need of replacement.

6.2 Current and anticipated funding is adequate to maintain high quality programs and services.

At present, although there are equipment needs, the supply budgets through district and Prop 20 funds are adequate to maintain high quality programs and services. However, should costs for consumables continue to increase and Prop 20 funds diminish; it may be difficult to purchase adequate instructional supplies.

6.3 Anticipated funding is adequate for the development of revised and new programs.

No new programs are anticipated and it is evident, with projected tight future budgets, it may be necessary to limit expenditures for consumables. We will have to become a little thriftier.

Area 7. COMMUNITY OUTREACH AND PROGRAM AWARENESS

7.1 Staff maintains appropriate links with community.

The biology faculty and technical staff are frequently asked by members of our community to provide expertise concerning issues they might have. These have included identifications of many different types of animals and plants persons have discovered on their property or animals. Members of the faculty have also engaged in public discussions concerning contemporary issues in biology and science in general, i.e. intelligent design versus science-evolution.

The faculty has also generously donated their time to the Math and Science Odyssey and multiple presentations to local elementary, middle and high school students.

7.2 Staff makes appropriate efforts to inform the community and students about each program and facilitate student participation in these programs.

On an annual basis, the biology faculty participates in the student orientations conducted each spring for local high school seniors coming to AVC in the fall semester. They also frequently meet with students and community groups on an ad hoc basis.

7.3 Where appropriate, advisory committees meet regularly and support the development of programs and services.

Not applicable.

Area 8. STATE AND FEDERAL COMPLIANCE

8.1 Program adheres to all state and federal guidelines.

The program in the biological sciences adheres to all state and federal guidelines with respect to the maintenance of live animals and the handling and disposal of chemical waste. The provision of a safe effective instructional environment is our principle responsibility.

8.2 Program adheres to all college policies and procedures.

The program in biological sciences adheres to all college policies and procedures.

Program: Mathematics

Table 7. Mathematics Faculty Contributing to Program Review.
1. Curriculum Team: Nancy Cholvin Eugenie Trow
2. Student Support and Development Team: Rebecca Kitto Lynda Little Luis Enriquez
3. Program and Student Learning Outcomes Team: Michael Tran Paul Ahad Pavinee Villapando
4. Personnel and Support Services Team: Debra Anderson Sharon Beckman Magdalena Caproiu
5. Facilities, Equipment, and Technology Team: Kenan Shahla Aemiro Beyene Nabeel Atique
6. Fiscal Support Team: Tooraj Gordi Fenggang Zhang
7. Community Outreach and Program Awareness Team: Richard Sieger Roberto Diaz
8. State and Federal Compliance Team: Joe Towe Daniel Byrne

Table 8. Courses and Number of Sections Taught in Mathematics from 2000-01 to 2006-07.

COURSE	ACADEMIC YEAR						
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06*	2006-07
MATH 020 Math Anxiety	3	2	2	2	2	2	2
MATH 021 Study Strategy	3	2	2	2	2	2	2
MATH 030 Arithmetic Fundamentals	1						
MATH 050 Arithmetic	24	28	32	31	44	59	78
MATH 050A Arithmetic-1st Part	5	3	3	2	3	3	2
MATH 050B Arithmetic-2nd Part	1	3	1	2	2	2	1
MATH 060 Prealgebra							27
MATH 099 Individual Self-Study	6	12	12	12	12	10	12
MATH 070 Elementary Algebra (100)	41	45	52	49	64	59	61
MATH 070L Elementary Algebra Lab (100L)				2	4	2	3
MATH 070A Elementary Algebra 1st Part	12	8	8	7	8	7	3
MATH 070B Elementary Algebra 2nd Part	7	9	5	6	5	6	3
MATH 080 Geometry (101)	7	7	6	8	8	5	5
MATH 102 Intermediate Algebra	33	36	34	32	41	38	55
MATH 102A Intermediate Algebra 1stPart	3	2	2	3	4	2	2
MATH 102B Intermediate Algebra 2nd Part	3	3	2	3	2	1	1
MATH 110 Math for Liberal Arts Students				2	1	2	
MATH 115 Statistics	21	24	30	33	45	45	36
MATH 120 Math for Teachers	2	3	5	4		2	3
MATH 125 Math for Bus.& Econ.	2	3	5	4	4	5	4
MATH 130 College Algebra	14	16	18	18	27	30	30
MATH 135 Plane Trigonometry	12	14	11	11	12	12	11
MATH 140 Pre-Calculus	5	7	6	6	6	7	6
MATH 150 Calculus & Analytical Geometry	8	8	9	7	9	7	9
MATH 160 Calculus & Analytical Geometry	5	5	5	4	4	6	5
MATH 210 Discrete Mathematics				1		1	
MATH 220 Linear Algebra	1	1	2	2	2	2	2
MATH 230 Intro Differential Equations	1	2	2	2	2	3	3
MATH 250 Calculus & Analytical Geometry	2	2	3	2	3	4	4
Totals	222	245	257	257	316	324	370

*No Intersession.

Area 1. CURRICULUM

Course Development

1.1 The curriculum supports the educational objectives of the mathematics program/discipline. New and revised courses address changes in the discipline and specifically address student needs.

Course offerings in Mathematics are shown in Table 8. In response to student needs, the numbers of sections taught has increased by 148 from 222 in 2000-01 to 370 in 2006-07.

New courses developed during the period Fall 2004 to present:

1. Math 060 (Prealgebra)
2. Math 070L (Elementary Algebra Lab)
3. Math 110 (Mathematics for Liberal Arts Students)
4. Math 210 (Discrete Mathematics)

Math 060 is a 4 unit, one-semester course. It is a prerequisite for Math 070 (Elementary Algebra). It is offered both as a traditional class as well as a computer enhanced class. The need for this course became obvious as the success rate of students in Math 070 was very low. After adding Math 060 as a prerequisite for Math 070 the success rate of our students in Math 070 increased.

Math 070L is an optional, zero-unit course intended to help students succeed in Math 070 or any math class that uses computer technology. It provides access to the computer software used in the Math 070 classes with an instructor present. This helps students complete course assignments and master learning objectives.

Math 110 is a survey of mathematics and is designed for liberal arts students. It introduces the art and history of mathematics and mathematical thoughts to a wide range of audiences with minimal technical involvement. Three major topics discussed are critical thinking, Arithmetic, and Geometry, both Euclidean and non-Euclidean.

Math 210 is a requisite for computer science and engineering courses, in particular electrical engineering. It also satisfies the general education requirement. The course focuses on four major topics: The Language of Mathematics, Combinatorics, Probability, and Graph Theory.

In developing new courses our faculty researches courses offered at other colleges and also takes into consideration the educational needs of our student population. When the need for a new course is identified, our faculty members bring the topic to one of our regular math, science and engineering division meetings where the topic is discussed and approved. After a new course is developed a course, it is reviewed and approved by the Dean and by the math, science and engineering faculty during one of our regular meetings. Then the faculty member involved in developing the course presents the course to the Academic Policies and Procedures committee for approval.

Need for new courses:

The Mathematics Department must offer computer lab courses to go with other classes in addition to Elementary Algebra Lab (Math 070L), such as Math 050L, Math 060L, Math 102L, etc. These classes offer students the opportunity to work using software in the course

they are taking, regardless of which text they are using. These labs will require additional staffing, equipment, and rooms.

The Mathematics Department must also offer Prealgebra (Math 060) as a two-semester option, Math 060A and Math 060B for students who need more time to understand and learn mathematics.

The Mathematics Department must also offer short courses/workshops to help students fill in missing knowledge that they need to have to succeed in the math course in which they are enrolled. For example, instructors in the Math Department have observed that many students do not know what constitutes a proof despite having passed Geometry in High School. The Math Department must offer short courses on proof techniques, operations with fractions and using the least common denominator, and review of a subject before taking the assessment test.

The Math faculty has developed Student Learning Outcomes based on the Course Objectives as presented in each Course Outline of Record. They have also identified a method for their assessment. The SLOs were developed following several informational workshops and general discussions within the faculty.

Course Revision

1.2 All courses are reviewed within a six-year cycle per Title 5, Section 55210(b)(3).

All math courses are being reviewed on a regular basis and revised as necessary.

1. Math 050A (Arithmetic-First Half with Small Assembly Setting) also takes into consideration the educational needs of our student population. When the need for revision for an existing course is identified, our faculty members bring the topic to one of our regular math, science and engineering division meetings where the topic is discussed and approved. Once revised, the course is reviewed and approved by the Dean and by the math, science and engineering faculty during one of our regular meetings. Then the faculty member involved in the revising of the course presents the course to the Academic Policies and Procedures committee for approval.

During the last three years we have updated the following courses:

1. Math 020 (Managing Math Anxiety)
2. Math 021 (Math Study Strategy)
3. Math 050 (Arithmetic)
4. Math 050A (Arithmetic-First Half with Small Assembly Setting)
5. Math 050B (Arithmetic-Second Half with Small Assembly Setting)
6. Math 070 (Elementary Algebra)
7. Math 070A (Elementary Algebra-First Half with Small Assembly Setting)
8. Math 070B (Elementary Algebra-Second Half with Small Assembly Setting)
9. Math 080 (Plane Geometry)
10. Math 099 (Individualized Self-Study Mathematics)
11. Math 102 (Intermediate Algebra)
12. Math 102A (Intermediate Algebra-First Half with Small Assembly Setting)

13. Math 102B (Intermediate Algebra-Second Half with Small Assembly Setting)
14. Math 115 (Statistics)
15. Math 120 (Math for Teachers)
16. Math 125 (Math for Business and Economics)
17. Math 130 (College Algebra)
18. Math 135 (Plane Trigonometry)
19. Math 140 (Precalculus)
20. Math 150 (Calculus and Analytic Geometry)
21. Math 160 (Calculus and Analytic Geometry)
22. Math 220 (Linear Algebra)
23. Math 230 (Introduction to Ordinary Differential Equations)
24. Math 250 (Calculus and Analytic Geometry)

Our faculty makes sure that the courses we offer cover the mathematical needs of the wide spectrum of students we have. We make sure that we offer all freshman and sophomore transfer courses in mathematics and all of their prerequisites, all mathematics courses needed for the Associate Degree as well as developmental courses.

In addition to traditional and computer enhanced classes our Division now offers many online classes. Math 070 (Elementary Algebra), Math 102 (Intermediate Algebra), and Math 130 (College Algebra) are now offered as online courses.

Math 115 (Statistics) is now offered both as a traditional class as well as a computer enhanced class. We will soon offer it as an online class.

Math 020 (Managing Math Anxiety) and Math 021 (Math Study Strategies) are short-term classes developed and taught by the Math Learning Specialist. These classes help freshmen develop skills necessary to be successful in their future math classes.

We have added many classes offered at the Palmdale campus in order to serve better our growing student population.

Our faculty maintains currency in math content by attending mathematics conferences, taking classes, and using computer programs such as EDUCO to enhance the teaching and learning of mathematics. As technology becomes increasingly integrated to the curriculum, computers and graphing calculators are used on a regular basis to enhance teaching and learning. In order to keep the prerequisites current our department has assigned each course to a committee consisting of two or three mathematics instructors. The committee reviews the course annually. This way we make sure that all of our courses are being reviewed annually and revised as necessary.

1.3 Courses which have not been taught within a three-year academic period are obsolete and have been removed from the college catalog. Courses which have not been taught within a two-year academic period are inactive and have been identified.

Obsolete courses:

Math 110 (Mathematics for Liberal Arts) is an obsolete course due to low demand.

Inactive courses:

Math 210 (Discrete Mathematics) is an inactive course due to low demand.

1.4 Courses address issues related to diversity and/or multicultural perspectives.

The wide range of math classes offered from basic skills, like Arithmetic, to transfer courses, like Math for Teachers, Statistics, Math for Business and Economics, Calculus, Differential Equations, make it possible for students from diverse backgrounds to find the classes that are appropriate for their level and interest and to take part in programs offered at AVC like business, nursing and science. The material in our courses contains word problems describing real life situations. The names used have Anglo, Latin, Asian, African, and other roots. The pictures and photographs in the textbooks we use contain people of all genders, all races and ages, some handicapped, without showing any discrimination against any particular segment of the population.

1.5 New programs developed during the period under review meet students' needs and are consistent with the college mission and ILOs.

No new programs were developed in Mathematics during the period of review; however, the new methods for delivery of existing were courses were developed to accommodate the instructional needs of basic skills and transfer students. Online or technology mediated courses and courses that are taught using technology (EDUCO Computer Program) satisfy our students' needs. The use of modern technology has greatly enhanced student learning in the last three years and it has contributed to a higher success rate among our students.

Math 115 (Statistics), Math 130 (College Algebra), and Math 150 (Calculus and Analytic Geometry) are offered also as Honors courses.

In addition to continuing to use Mathematica and Pass Key (Computer math programs) we also use Maple to enhance teaching and learning.

1.6 Existing programs are revised as needed.

1. During the last three years we have updated all of our courses. See 1.2 above.
2. We have added a Math Lab (Math 070L).

3. We have added Math 060 to our course offerings.
4. We have changed the prerequisite for Math 070. The prerequisite used to be Math 050. Starting this year the prerequisite is Math 060.
5. We have established Math 102 as the prerequisite for Math 115 and Math 125. The prerequisite for Math 115 was Math 070 and Math 125 had Math 102 as an advisory only.

It is anticipated that the above changes have contributed to the higher success rate of our students; however, this has not been validated.

1.7 Courses are taught within the parameters described in the outline of record.

Our faculty members match the outline of record with the material in the textbooks currently in use, section by section. Full-time math instructors make every effort to communicate the importance of covering the material as described in the outline of record to the part-time faculty. Full-time faculty performs peer evaluations of both full-time and adjunct faculty. During the evaluation process we review our peers' syllabi to make sure they are within the parameters described in the Course Outline of Record.

1.8 Faculty and staff use innovative strategies to meet student needs and staff development supports the development of these strategies.

Our faculty and staff use a variety of innovative strategies to meet the needs of our students. In addition to traditional lecture our faculty is trained in the use of collaborative learning, use of technology to enhance teaching and learning, self-paced learning, online teaching, and assigning individual and group projects.

Antelope Valley College offers a multitude of opportunities for staff development through flex activities, on-campus workshops and seminars, as well as by offering compensation for attending workshops and classes' off-campus.

Classified staff help support faculty efforts by making sure that the computers, projectors, copiers, and printers are working properly, arranging faculty meetings, notifying faculty by e-mail, ordering textbooks and supplies, and making classroom arrangements. Student assistants work as tutors at the Learning Center helping the students who need extra help with understanding mathematical concepts or with solving problems.

1.9 Course scheduling provides students with reasonable access to meet their objectives and promotes strong enrollment patterns.

As indicated in Table 8, the number of math sections taught has increased from 222 in 2000-01 to 370 in 2006-07. This translates to an increase in FTES from 6492 to 6977 over that period of time (Table 9).

	2003-04		2004-05		2005-06		2006-07	
	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
FTES	432.6	413.9	435.7	430.7	471.1	437.6	494.2	490.4
WSCH	13,359.8	12,782.5	13,456.4	13,299.5	14,547.2	13,514.8	15,262.7	N/A
Enrollment	3,318.0	3,174.0	3,331.0	3,298.0	3,612.0	3,365.0	3,634.0	N/A
FTEF	13.3	13.7	14.2	16.1	17.0	17.3	18.0	N/A

Our course scheduling contributes to strong enrollment. Courses are offered at many different time slots and at various options, such as one day, two days, three days or four days per week. Classes that are in great demand are offered mornings, afternoons, late afternoons and evenings. We also offer Friday only classes, and Saturday only classes to accommodate our working students and the students who have family obligations. We also offer late-start classes that start after the third week of the semester and end at the end of the semester. We offer classes both at the Lancaster campus as well as at the Palmdale campus to accommodate students who live in both regions of our district. We also offer convenient online classes.

The barriers that hinder student access include:

1. Too few classrooms;
2. Classrooms without equipment, such as enough boards for instructors to write and boards for students to practice on, missing computers or computers not working;
3. No dedicated “Weekend College” with a clear path for graduation with support services;
4. Inaccurate counseling;
5. Inaccurate placement through assessment testing: The software used for assessment is programmed to react to a student’s first wrong answer and does not give the student a chance to show what he/she knows (e.g., many math instructors report several students each semester placed into Arithmetic who could have succeeded in a higher class).

Course and Program Support

1.10 Faculty and staff are familiar with and work closely with other Student Services and Academic Affairs faculty and staff in program development and student referral.

The Math Department works closely with Academic Divisions to ensure that we offer all math courses needed so that our students can be successful in other classes such as physics, chemistry, biology, business, economics, computer science, engineering, and nursing.

The Math Department works well with the Admissions and Records Office. We often refer students to Admissions and Records for a late enrollment, or change in schedule. The Math faculty provides the Admissions and Records with accurate census, attendance and grade records in a timely manner.

The Math Department also works in collaboration with the Assessment office. The Assessment office provides great help to the Math Department as it tests our incoming

students and tries to place them in the appropriate level math class ensuring the students' success.

The Math Department also works well with CalWORKS, the Career Center, Counseling, and EOPS/CARE.

The Disabled Student Services is of great value to our Department as it provides services to students with both physical as well as learning disabilities. For example, the DSS office provides interpreters for our deaf students, helpers for the blind, and a quiet place for testing for students identified with special needs that need extra time to complete their tests. Note taking is another service requested by DSS for some of our students; DSS needs to provide the note takers.

The Learning Center also contributes immensely to the success of our students by providing tutoring, Reading Lab, Writing Center, ESL Support and most importantly a Math Center. The Math Center of the Learning Center supports the Math 099 program, a self-paced, individualized, non-lecture, positive attendance program. This program includes a large range of classes, such as Math 050, Math 060, Math 070, Math 080, Math 102, Math 130, Math 135, and Math 140. The Math Center provides all instructional resources, including tests, as well as a database with students' records, including their positive attendance, and stores students' individual folders. The Math Center also trains tutors needed to assist our students. The Math Center also provides proctoring of make-up tests for students in all math classes. There is a strong collaboration between the Math Department faculty and the Math Center through a referral system. The Math Center offers workshops and individual conferences to help students be successful in their classes.

The Library also contributes to our students' success by providing textbooks placed on reference, and a multitude of learning resources.

The Transfer Center also provides great help to our students as they complete their education at AVC and prepare to transfer to a four-year college.

1.11 Recent developments in instructional technology have been incorporated into courses and student support services consistent with the objectives of the programs and services.

Graphing calculators and computer programs are being used to enhance the teaching and learning of mathematics. The use of EDUCO, a Computer Math Program, helps students practice and learn math using an interactive approach that helps them progress at their own pace.

Online classes provide students with a convenient way to learn and complete their classes successfully.

1.12 Courses are articulated with institutions of higher education and local high schools.

Our courses are articulated with the University of California and with the California State University. We also articulate our courses with the Antelope Valley High School District and have worked with the local Middle Schools. The dean forms faculty committees that are very active in successful articulation of our courses. All these efforts help in the smooth transition of students from High School to AVC and from AVC to a four-year college.

1.13 The courses and/or program meet one or more of the primary goals articulated in the College Mission Statement.

Our math program offers many transfer courses, such as Statistics, Trigonometry, College Algebra, Calculus, Differential Equations, Linear Algebra, Math for Teachers and Math for Business that are equivalent to their counterparts at four-year institutions. We also offer an Associate Degree in Mathematics that enables a student to transfer as mathematics major.

We offer many sections of basic skills math courses. These non transferable courses, such as Math 050, Math 060, Math 070, and Math 080, help students develop strong foundational math skills enabling them to successfully complete the general education requirements needed for various academic and career technical programs.

1.14 The courses and/or program meet one or more of the college's ILOs.

It is readily apparent the courses and program in mathematics meets the college's ILOs. Through successful completion of these courses, students can acquire basic skills, be able to transfer to an institution of higher education or enter the workforce and contribute to the economy. They are further able to think critically and apply operationally the logic and reasoning skills need to make decisions and to plan for the future.

1.15 The courses and/or program are consistent with plans articulated in the Educational Master Plan.

The Mathematics Program offers a wide variety of courses that fulfill many Associate Degree requirements, Certificate requirements, as well as prepare students for transferring to a four-year college. In addition, the program offers basic skills math courses that prepare our students to be successful in their chosen field of study.

Area 2: STUDENT SUPPORT AND DEVELOPMENT

2.1 The institution provides all prospective and currently enrolled students with current and accurate information about its programs, admission policies, graduation requirements, social and academic policies, refund policies, student conduct standards, and complaint and grievance procedures.

Each present and future student of Antelope Valley College can easily find current and accurate information about its programs, admissions policies, social and academic policies, refund policies, student conduct standards, and complaint and grievance procedures. This information is available the schedule of classes for each semester, as well as on the AVC website. A handbook which addresses student conduct standards is available all over campus.

Some mathematics instructors outline in their syllabi the behaviors they wish their students to model. Available in the schedule is a schema (a flowchart) showing the suggested order of mathematics courses offered at AVC. Students not certain of which mathematics class they should take can ask the counselors which courses are required for the major or university they are choosing.

We would like to do a better job of attracting to online mathematics classes, those students who have the study skills and motivation needed to succeed in them. One suggestion is that at the orientation meeting of an online class, the instructor distributes a copy of the study guide for the final examination of the previous class. For example, Intermediate Algebra students would be given a copy of the study guide for Beginning Algebra; this way, students could see the level they need to have attained to begin the class. We can also print *caveats* in the schedule of classes, suggesting that online mathematics classes work best for students reviewing the material, rather than those who are meeting it for the first time.

2.2 The program identifies the educational support needs of its student population and provides appropriate services to address those needs.

The mathematics program at AVC identifies the support needs of students and provides appropriate services. The math learning specialist in the Learning Center provides workshops at the beginning of each semester for students to get a quick review of what they should know for the course they are in. She also provides workshops throughout the semester if as few as two students request one on the same topic. If instructors request, they may have a Supplemental Instruction tutor assigned to a class, to attend the classes and act as tutor to the students of that class. Trained student tutors are available on a drop in basis in the Learning Center, under the guidance of the math learning specialist. There is a dedicated computer lab on campus (ME 100) which is open 35 hours a week for students to do online homework, with a technician available who helps with software and math problems. There is a campus-wide Early Alert program, which instructors may use to identify students having problems and direct them to help.

The grant from the US Department of Education, Minority Science and Engineering Improvement Program will help us to address changes in the student population, by increasing the number of minorities in the science pipeline that leads to undergraduate and graduate studies. The goal of the grant is to reduce attrition and increase success in basic skills level mathematics classes, our biggest challenge.

In spite of all the support provided by the Math Lab, the computer lab and individual instructors, faculty still observe lack of study skills and of resourcefulness in their students. The creation of a mandatory orientation for math students (or campus wide) might make an impact. Topics covered in an orientation would include:

- how to take notes;
- how to recognize when you know (or don't know);
- managing your schedule;
- attendance is not enough – how to do homework;
- why/how to arrive on time;
- why/how to stay until the class ends;
- how/where to research;
- citing sources;
- reading graphs;
- presentation of homework and projects (clear and precise);
- help with proofreading and accuracy;
- using e-mail and other technology;
- when not to use technology;
- how to get help;
- how to seek out the answer before you ask for help;
- meeting deadlines(in a company you must meet deadlines or your company fails);
- imagine the classroom is a job interview; and
- sleep.

2.3 The program involves students, as appropriate, in planning and evaluating student support and development services.

The program involves students in planning and evaluating student support. There are student tutors in the Learning Center, who are available on a casual, drop-in basis. Supplemental Instruction tutors attend every class session and can provide feedback concerning their designated course.

Additionally we would like to see more student assistants hired to help the math lab technician in ME100, the EDUCO lab. We would like to improve the involvement of the mathematics instructors with the Learning Center tutors so that there is a better flow of information both ways between the instructors, students and tutors. This would be very beneficial. Instructors should be attending the weekly meetings of the Learning Center tutors from time to time; for non-tenured faculty, this should be mandatory at least once a semester. It is only an investment in the future for new faculty to know all the workings of our program, and all the parts of it.

2.4 Admissions and assessment instruments and placement practices are designed to reduce bias and are regularly evaluated to assure effectiveness.

The assessment and placement of math students has evolved into a fairly successful process. Students are required to take a math assessment test, professionally administered. The instrument used is the ACT Compass/ESL test, used widely across the U.S. Based on local cut scores pre-determined through an intensive assessment study using multiple measures; counselors meet with students and discuss their results. These individual cut scores place students into an appropriate math class. Transcripts of previous college course work can be used to document satisfaction of prerequisites. Cutoff scores have been predetermined to identify the target course for a given student.

The screening of students in this process seems to have corrected the problem we once had of students enrolling in math classes for which they were not properly prepared. The opinion of many math instructors, in fact, is that too many students are now placed below their appropriate math level. Here are some recommendations for enhancing the effectiveness of the assessment testing.

- i) Resume the offering of a workshop to assist students in preparing for the placement test. This workshop would be designed and taught by a math instructor.
- ii) Adjust the cutoff scores downward to allow students to enter higher level courses than those recommended at present.

Another problem to be addressed is that of high attrition in online math classes due to improper placement of students. Students need to be advised more effectively about the degree of difficulty in learning math via an online delivery system. It is recommended that a student attempt an online math course only if reviewing the material and not learning it for the first time. We should improve our communications with the counseling division to be sure the students are advised properly in that regard.

2.5 The program provides appropriate comprehensive, reliable, and accessible services to its students regardless of service location or delivery method.

Math classes are taught primarily on the main campus with an ever increasing number taught at the Palmdale campus as well. Many math courses are now taught online as well as in the classroom, providing our services to those unable to travel to campus on a regular basis. On the main AVC campus all math courses in our curriculum are offered during daytime hours and at night, providing a variety of choices. The courses serving the highest volume of students are offered in classes that meet either once, twice or three times a week, to satisfy the needs of our broad spectrum of students.

Delivery methods employed in math classes include: a traditional lecture and discussion method; computer enhanced lecture / lab setting and online tutorial delivery with one-on-one instructor support. Many classes are conducted with the support of web-based

programs including Educosoft, Math Zone and PassKey. Those classes taught with computer support depend heavily on the math computer labs. Classes taught primarily in traditional lecture mode depend heavily on blackboards for student demonstration and practice.

Considering the predicted growth in our student population and the increase in our use of computers in the classroom, it is clear we need to provide more math computer lab space. The additional lab(s) will require additional instructional and technical support staff. The computer lab set-up at the Palmdale campus needs to be enlarged and improved as well.

The popularity of the recently added online math courses indicates we need to provide more classes designed with that delivery method. Distance learning has become very competitive, and to keep AVC in the market, we should consider the possibility of and feasibility of teaching math totally online to serve students in distant locations. Presently all online math classes are taught partly on campus. We should also explore the development of online offerings in our higher level courses such as calculus and differential equations.

2.6 The institution, in keeping with its mission, creates and maintains a campus climate that serves and supports its diverse student population.

The math program serves and supports its diverse student population. Math classes are offered to persons of all ethnic origins. One means of enhancing the learning experience for a diverse student population is to offer a variety of teaching methods and styles, as described above.

The math division has certainly contributed to a healthy campus environment by hiring new instructors with very diverse backgrounds. Of the 19 full time math faculty, twelve were born outside the United States. In the pool of adjunct math instructors the proportions are similar.

The Math Division has solicited and received federal funding support via the Title V and MSEIP grants designed to improve success rates among minority students. These grants are both geared to improving retention of students in the basic skills levels of math and encouraging more students, particularly those from minority groups, to continue studying math and science and to pursue careers related to engineering and technology. The funds have been used in a variety of ways to provide an environment conducive to the success of all our students.

2.7 The institution supports a co-curricular environment that fosters intellectual, ethical, and personal development for all its students and encourages personal and civic responsibility.

Students who participate in the math tutoring program have a distinct opportunity for social involvement. Math tutors constitute the largest group of tutors trained by the Learning Center. Tutors and tutees alike benefit from their academic encounters in the

Math Lab. The tutor training itself is a social experience that encourages personal growth and development, a sense of pride and responsibility.

Students in higher level math classes have an opportunity to serve as tutors outside the AVC campus. Local high schools occasionally request support for their math tutoring programs and a number of AVC students have found the participation very beneficial.

The Math and Science Odyssey, an annual event for eighth grade students, provides another opportunity for AVC students to learn about civic responsibility and outreach. The Learning Center is used for many of the Odyssey workshops, so the staff of students on hand contributes a great deal to the success of the event. Other students help across campus as well.

In the future, the math instructors might create a Math Club.

2.8 Student records are maintained permanently, securely, and confidentially, with provision for secure back up of all files.

In the area of maintenance of records, our program, and the college, is in need of some changes. In the past, the Admissions and Records department collected and kept all records of attendance and grades for every class in AVC. If there were a discrepancy about grades, the instructor would be presented with the relevant records, and a determination could be made quickly and fairly.

With the advent of electronic grade submission, Admissions and Records no longer keeps these records, but instructs academic faculty to be responsible for them. This is an inconsistent system with no safeguards. Some instructors may be keeping paper records, some may be using software, while others may not be keeping records at all. One advantage to Educsoft, Math Zone, and other course management systems, is that these records are easily kept.

In the area of controlling records, our program needs to decide on one consistent, reliable and easily manageable system. This will be some form of electronic course management, and it will be used college-wide.

2.9 The program systematically evaluates the appropriateness, adequacy, and effectiveness of its student services and uses the results of the evaluation as a basis for improvement.

The methods used for systematic evaluation of our program include regular evaluations of all those who work in it, and the system program review which produced this report.

We will use the information gleaned from this program review to make the following changes:

- we will push for consistency in record-keeping

- we will adopt a reliable, navigable system of record-keeping
- we will have a warning paragraph about online mathematics inserted in the schedule of classes
- we will routinely give all online students the exam review of the previous class so they will know the standard they should be at
- we will encourage all mathematics faculty to attend tutor meetings
- we will develop a workshop to prepare students for the math assessment test and help to redefine cutoff scores
- we will consider the formulation of a math club
- we will consider ways to improve communications with the counselors
- we recommend a mandatory orientation be developed for math students (or all students)

Area 3: STUDENT LEARNING OUTCOMES

3.1 Expectations for student learning outcomes are clearly articulated and actual student learning outcomes are used in the assessment of course and program effectiveness.

Expectations for student learning outcomes are clearly articulated in the Course Outlines of Record and syllabi for all math courses within the Mathematics, Science, and Engineering Division. Since the Fall 2007 semester, the math faculty have developed SLOs for each course and have identified an assessment vehicle to determine their effectiveness. At present, almost every student takes the Math Placement Test administered at the Assessment Center, in order for the counselors help in placement of the student into the appropriate math course. In courses such as Math 050, 060, 070, and 102, some instructors give an initial examination during the first week to gauge students' knowledge upon entry into the course. The Math Program has adopted a Department Final Exam for four math courses (Math 050, 060, 070, and 102). This test is designed by the faculty and is intended to determine if the COR has been covered and to determine if the SLOs have been met. For all other courses, faculty do attempt to measure SLOs through classroom test and quizzes. It is anticipated the assessment portion of these outcomes will also be developed in the future with the help of the Student Learning Outcome committee.

3.2 Student evaluations are an integral part of the assessment of course and program effectiveness.

Faculty members conduct student evaluations of the instructor every semester. The evaluations are known to the dean only when the faculty member is formally evaluated per the tenure and evaluation procedure. The results of these evaluations have consistently supported the fact that student expectations and needs are being met by the programs and the faculty. Changes are made as needed to ensure student success. Ideas for improvement of the courses have been implemented as appropriate. For the purpose of this program review, an extensive student survey of the classes and the program was

administered in most of the classes during the Fall 2007 semester. The results are presented in Table 10, Basic Skills Courses, and Table 11, Transfer Courses. The survey sought students' opinions about the division's curriculum, scheduling, facilities and equipment, student support services, and community outreach. Students provided useful demographic data and were able to write comments about specific items on the survey.

Table 10. Student Survey Fall 2007 Mathematics

		Basic Skills Courses						
Question		50	60	70	80	102	Total	%
2: Gender	Male	108	58	96	5	100	367	42%
	Female	93	104	142	2	161	502	58%
							869	100%
3: Age	15-17	18	5	10	0	6	39	3%
	18-20	215	101	129	4	145	594	40%
	21-24	29	13	35	0	40	633	42%
	25-30	13	15	31	2	23	84	6%
	31-39	9	15	15	0	19	58	4%
	40-49	14	11	13	1	14	53	4%
	50-59	7	4	7	0	7	25	2%
	60+	3	0	2	0	1	6	0%
							1492	100%
4: Ed Goal	Trnsf w/ AA/AS	197	100	142	5	169	613	63%
	Trnf w/o AA/AS	30	27	30	0	43	130	13%
	AA/AS only	37	10	29	0	22	98	10%
	Voc Cert	4	3	7	0	2	16	2%
	Interest	6	1	0	0	4	11	1%
	Skills	1	0	5	1	1	8	1%
	Lice/Cert	5	2	3	0	3	13	1%
	Ed dev/BS	5	2	2	0	3	12	1%
	HS credit	0	0	0	0	0	0	0%
Undecided	24	19	18	1	17	79	8%	
							980	100%
5: Race	AN/AI	4	2	1	0	6	13	1%
	AA/PI	7	9	10	0	19	45	5%
	B/AA	79	26	31	0	31	167	17%
	H	108	50	60	1	84	303	31%
	W/C	88	65	106	6	104	369	38%
	Other	22	10	27	0	15	74	8%
							971	100%
6: #courses	1-2	246	138	163	3	149	699	71%
	3-5	58	17	60	3	90	228	23%
	6-10	3	2	7	0	9	21	2%
	11+	4	7	7	1	12	31	3%
							979	100%
7: Status	FT	199	107	149	2	170	627	64%
	PT	112	57	87	5	90	351	36%
							978	100%

	SA	128	52	108	0	92	380	39%
	A	153	97	114	5	151	520	53%
	D	18	11	14	1	9	53	5%
8: Course offerings meet my needs	SD	5	2	3	1	6	17	2%
	NA	4	2	0	0	0	6	1%
							976	100%
9: Requirements for crt. programs or AA degree are clear and easy to understand	SA	73	32	52	0	52	209	21%
	A	177	94	139	3	146	559	57%
	D	40	20	30	3	42	135	14%
	SD	7	7	6	0	11	31	3%
	NA	10	8	14	1	10	43	4%
							977	100%
10: Courses contribute personal and professional development	SA	79	27	50	0	55	211	22%
	A	175	109	142	3	161	590	61%
	D	23	9	26	3	23	84	9%
	SD	4	3	3	0	10	20	2%
	NA	17	15	18	0	13	63	7%
							968	100%
11: Courses are relevant and up to date	SA	106	36	70	0	78	290	30%
	A	171	117	150	4	157	599	61%
	D	17	4	9	3	12	45	5%
	SD	2	0	1	0	2	5	1%
	NA	7	7	12	0	9	35	4%
							974	100%
12: The programs prepares me for career/future education	SA	94	37	66	0	57	254	26%
	A	169	100	137	5	151	562	58%
	D	26	14	30	2	34	106	11%
	SD	7	3	5	0	12	27	3%
	NA	6	9	5	0	6	26	3%
							975	100%
13: Days and times of scheduled courses meet my needs.	SA	128	47	69	1	76	321	33%
	A	137	89	129	2	143	500	51%
	D	31	20	28	3	33	115	12%
	SD	6	8	10	1	4	29	3%
	NA	2	0	3	0	1	6	1%
							971	100%
14: Courses that I am interested are offered frequently enough	SA	76	19	48	0	53	196	20%
	A	153	95	126	1	132	507	52%
	D	61	38	44	5	53	201	21%
	SD	8	6	18	1	13	46	5%
	NA	5	6	7	0	8	26	3%
							976	100%
15: Classrooms meet my needs	SA	91	24	65	0	62	242	25%
	A	164	113	129	5	163	574	59%
	D	27	16	24	1	17	85	9%
	SD	10	1	7	0	9	27	3%
	NA	13	10	17	1	7	48	5%
							976	100%
16: Computer labs meet my needs	SA	85	37	56	0	50	228	24%
	A	154	88	117	5	110	474	49%

	D	20	13	14	0	25	72	7%
	SD	6	2	8	0	11	27	3%
	NA	34	24	42	2	63	165	17%
							966	100%
17: Equipment and materials meet my needs	SA	76	36	54	0	54	220	23%
	A	182	113	143	6	155	599	62%
	D	18	6	22	1	23	70	7%
	SD	7	4	3	0	8	22	2%
	NA	18	4	18	0	18	58	6%
							969	100%
18: Promotion by instructors regarding educational and career opportunities meets my needs	SA	87	22	50	1	46	206	21%
	A	164	99	144	2	159	568	59%
	D	18	16	16	3	23	76	8%
	SD	5	1	2	0	4	12	1%
	NA	28	23	30	1	25	107	11%
							969	100%
19: Program support staff are helpful and courteous	SA	84	29	58	0	51	222	23%
	A	166	98	135	6	140	545	56%
	D	23	11	14	1	20	69	7%
	SD	6	4	3	0	7	20	2%
	NA	21	21	31	0	40	113	12%
							969	100%
20: Lab Techs are knowledgeable and courteous	SA	74	30	43	0	46	193	20%
	A	145	76	111	2	92	426	44%
	D	11	4	8	0	14	37	4%
	SD	5	3	5	0	8	21	2%
	NA	65	50	73	5	98	291	30%
							968	100%
21: Math tutors in the Learning Center are knowledgeable and courteous	SA	68	22	51	0	47	188	19%
	A	116	59	74	2	85	336	35%
	D	12	3	8	0	13	36	4%
	SD	2	3	6	0	6	17	2%
	NA	101	76	103	5	107	392	40%
							969	100%
22: There is adequate publicity about this program in the community	SA	56	15	33	0	31	135	16%
	A	148	78	116	1	11	354	41%
	D	28	25	43	2	48	146	17%
	SD	10	6	6	0	8	30	3%
	NA	57	39	41	4	59	200	23%
							865	100%

Table 11. Student Survey Fall 2007 Mathematics

TransferCourses

Question		115	120	125	130	135	150	160	230	250	Total	%
2: Gender	Male	57	3	9	53	50	38	29	10	9	258	49%
	Female	112	14	8	53	30	26	15	3	6	267	51%
											525	100%
3: Age	15-17	4	0	1	10	9	8	3	1	2	38	7%
	18-20	83	5	6	77	48	33	26	2	7	287	55%
	21-24	37	5	5	14	12	8	8	6	3	98	19%
	25-30	18	0	1	1	7	2	3	0	3	35	7%
	31-39	9	2	2	3	1	4	1	2	0	24	5%
	40-49	10	1	2	3	1	4	3	1	0	25	5%
	50-59	11	4	0	2	0	0	0	1	0	18	3%
	60+	0	0	0	0	1	0	0	0	0	1	0%
											526	100%
4: Ed Goal	Trnsf w/ AA/AS	124	11	11	74	55	39	16	8	8	346	66%
	Tranf w/o AA/AS	34	2	3	26	17	17	22	5	7	133	25%
	AA/AS only	2	0	0	2	1	2	0	0	0	7	1%
	Voc Cert	0	0	0	0	0	0	0	0	0	0	0%
	Interest	2	0	0	1	1	2	0	0	0	6	1%
	Skills	0	1	0	1	1	1	1	0	0	5	1%
	Lice/Cert	1	1	0	0	0	0	0	0	0	2	0%
	Ed dev/BS	4	0	0	0	2	0	2	0	0	8	2%
	HS credit	0	0	0	0	0	0	0	0	0	0	0%
Undecided	5	1	2	5	3	2	3	0	0	21	4%	
											528	100%
5: Race	AN/AI	2	0	0	2	0	0	0	0	0	4	1%
	AA/PI	15	2	1	11	7	11	6	0	1	54	10%
	B/AA	23	0	4	8	3	5	1	1	0	45	8%
	H	40	5	4	23	20	11	13	3	2	121	23%
	W/C	74	9	5	52	38	33	18	7	7	243	46%
	Other	13	1	3	22	11	4	6	1	5	66	12%
											533	100%
6: #courses	1-2	85	6	9	55	38	30	11	1	3	238	45%
	3-5	68	6	7	47	35	29	21	3	10	226	43%
	6-10	9	2	0	2	7	2	5	6	1	34	6%
	11+	9	1	1	2	0	2	7	3	1	26	5%
											524	100%
7: Status	FT	107	9	7	92	60	51	29	8	10	373	71%
	PT	64	8	10	15	19	13	15	5	5	154	29%
											527	100%
8: Course offerings meet my needs	SA	82	5	7	49	33	25	17	11	8	237	45%
	A	84	10	8	55	44	32	26	2	7	268	51%
	D	4	2	0	3	1	4	0	0	0	14	3%

SD	1	0	1	0	0	1	0	0	0	0	3	1%
NA	1	0	0	0	1	1	1	0	0	0	4	1%
											526	100%

9: Requirements for crt. programs or AA degree are clear and easy to understand	SA	57	1	4	28	17	20	9	5	3	144	28%
	A	90	11	8	55	46	27	21	4	11	273	53%
	D	15	3	3	16	11	6	4	2	0	60	12%
	SD	5	0	1	2	2	1	2	0	0	13	3%
	NA	4	2	1	5	2	1	6	1	1	23	4%
											513	100%

10: Courses contribute personal and professional development	SA	49	2	3	30	20	16	8	6	1	135	26%
	A	96	11	12	64	45	34	24	3	12	301	58%
	D	15	0	1	7	1	2	4	2	0	32	6%
	SD	2	1	0	0	1	1	1	0	1	7	1%
	NA	8	3	1	6	11	10	7	1	1	48	9%
											523	100%

11: Courses are relevant and up to date	SA	57	5	7	40	31	19	16	4	6	185	35%
	A	99	10	8	63	47	43	26	8	9	313	59%
	D	8	1	0	3	0	1	1	0	0	14	3%
	SD	1	1	0	1	0	0	0	0	0	3	1%
	NA	7	0	2	1	1	0	1	0	0	12	2%
											527	100%

12: The programs prepares me for career/future education	SA	51	7	6	37	25	24	16	5	4	175	33%
	A	90	5	10	54	42	32	24	6	10	273	52%
	D	16	3	1	9	4	3	1	1	0	38	7%
	SD	4	2	0	0	0	0	0	0	0	6	1%
	NA	11	0	0	7	6	4	3	0	1	32	6%
											524	100%

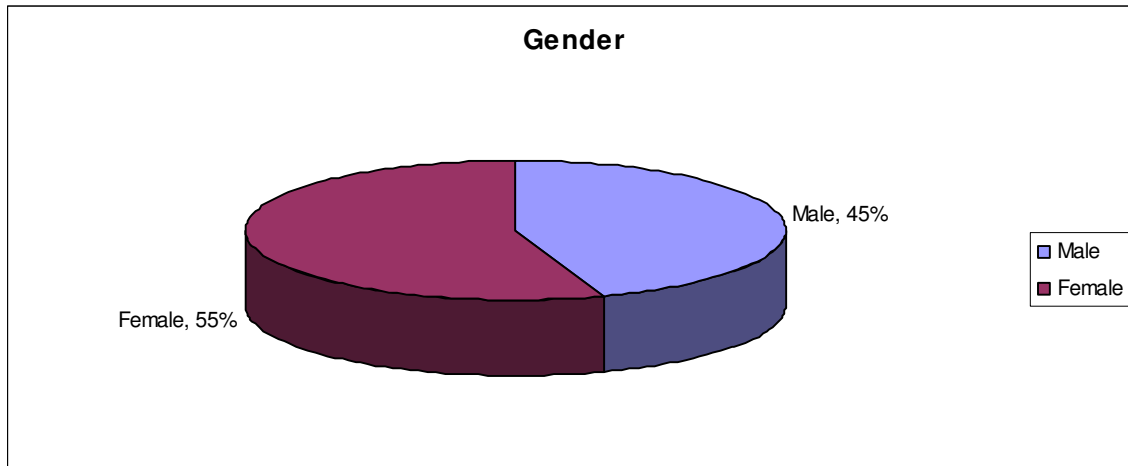
13: Days and times of scheduled courses meet my needs.	SA	63	3	2	28	24	15	10	4	1	150	29%
	A	84	9	12	65	49	30	20	5	7	281	54%
	D	21	2	3	8	4	14	8	0	2	62	12%
	SD	3	3	0	6	0	4	3	3	5	27	5%
	NA	1	0	0	0	0	0	1	0	0	2	0%
											522	100%

14: Courses that I am interested are offered frequently enough	SA	36	3	2	17	11	8	3	3	2	85	16%
	A	76	8	10	59	39	31	18	3	6	250	47%
	D	43	2	4	21	22	18	13	3	6	132	25%
	SD	13	3	0	8	2	4	8	3	1	42	8%
	NA	5	1	1	3	4	2	2	0	0	18	3%
											527	100%

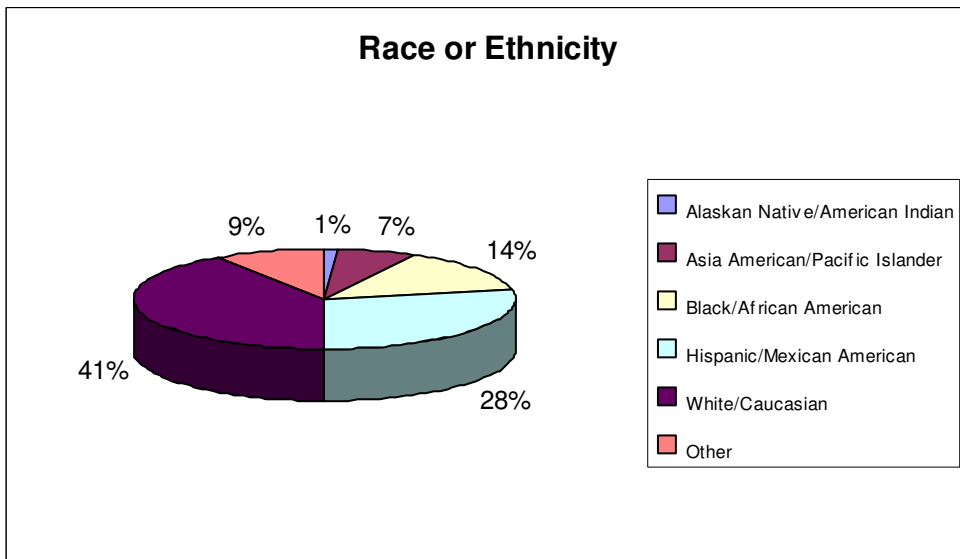
15: Classrooms meet my needs	SA	57	3	4	27	16	14	13	5	6	145	27%
	A	94	10	11	58	52	42	24	7	9	307	58%
	D	11	2	2	10	4	3	2	0	0	34	6%
	SD	3	2	0	8	1	0	1	0	0	15	3%

	NA	7	0	0	10	4	4	4	0	0	29	5%
											530	100%
16: Computer labs meet my needs	SA	35	2	4	21	12	10	8	3	2	97	19%
	A	77	6	9	42	31	20	21	5	6	217	42%
	D	9	0	0	6	2	6	1	2	1	27	5%
	SD	1	1	0	2	1	0	1	1	0	7	1%
	NA	50	8	4	34	30	25	13	1	6	171	33%
											519	100%
17: Equipment and materials meet my needs	SA	36	5	3	29	17	12	7	3	4	116	22%
	A	101	9	12	55	43	38	31	7	9	305	59%
	D	6	0	0	10	5	6	1	0	0	28	5%
	SD	6	1	1	0	0	1	0	0	0	9	2%
	NA	23	2	1	12	10	6	5	2	2	63	12%
											521	100%
18: Promotion by instructors regarding educational and career opportunities meets my needs	SA	38	5	0	24	17	13	10	4	2	113	22%
	A	92	10	13	63	47	32	25	7	9	298	57%
	D	20	0	2	7	2	5	4	0	1	41	8%
	SD	1	1	0	1	2	3	0	0	0	8	2%
	NA	22	1	2	12	9	9	5	1	3	64	12%
											524	100%
19: Program support staff are helpful and courteous	SA	34	3	1	24	17	16	11	3	1	110	21%
	A	83	9	11	58	39	32	20	7	10	269	52%
	D	14	1	1	8	2	2	2	0	1	31	6%
	SD	3	1	0	2	1	0	0	0	0	7	1%
	NA	36	3	4	15	18	13	11	2	3	105	20%
											522	100%
20: Lab Techs are knowledgeable and courteous	SA	24	1	1	17	14	8	8	2	1	76	14%
	A	60	4	5	42	19	14	9	4	4	161	31%
	D	4	0	0	1	0	3	3	0	2	13	2%
	SD	4	1	1	1	0	1	2	0	0	10	2%
	NA	80	11	10	47	45	37	22	6	8	266	51%
											526	100%
21: Math tutors in the Learning Center are knowledgeable and courteous	SA	23	2	1	19	17	9	12	3	0	86	16%
	A	51	1	4	35	18	18	10	5	7	149	28%
	D	7	1	1	1	2	1	6	0	1	20	4%
	SD	6	1	0	1	0	1	1	0	0	10	2%
	NA	85	12	11	52	40	32	15	4	7	258	49%
											523	100%
22: There is adequate publicity about this program in	SA	18	3	1	11	5	7	5	3	0	53	10%
	A	72	5	9	60	35	24	18	2	9	234	45%
	D	30	2	2	11	18	9	8	3	3	86	16%
	SD	6	1	1	1	4	4	2	2	0	21	4%

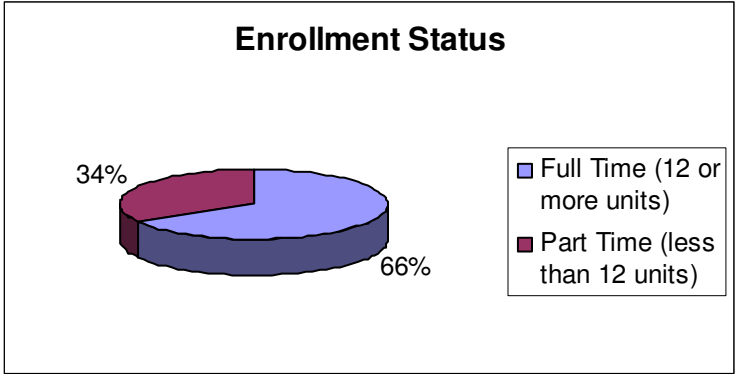
the community	NA	46	6	4	25	16	18	11	1	3	130	25%
											524	100%



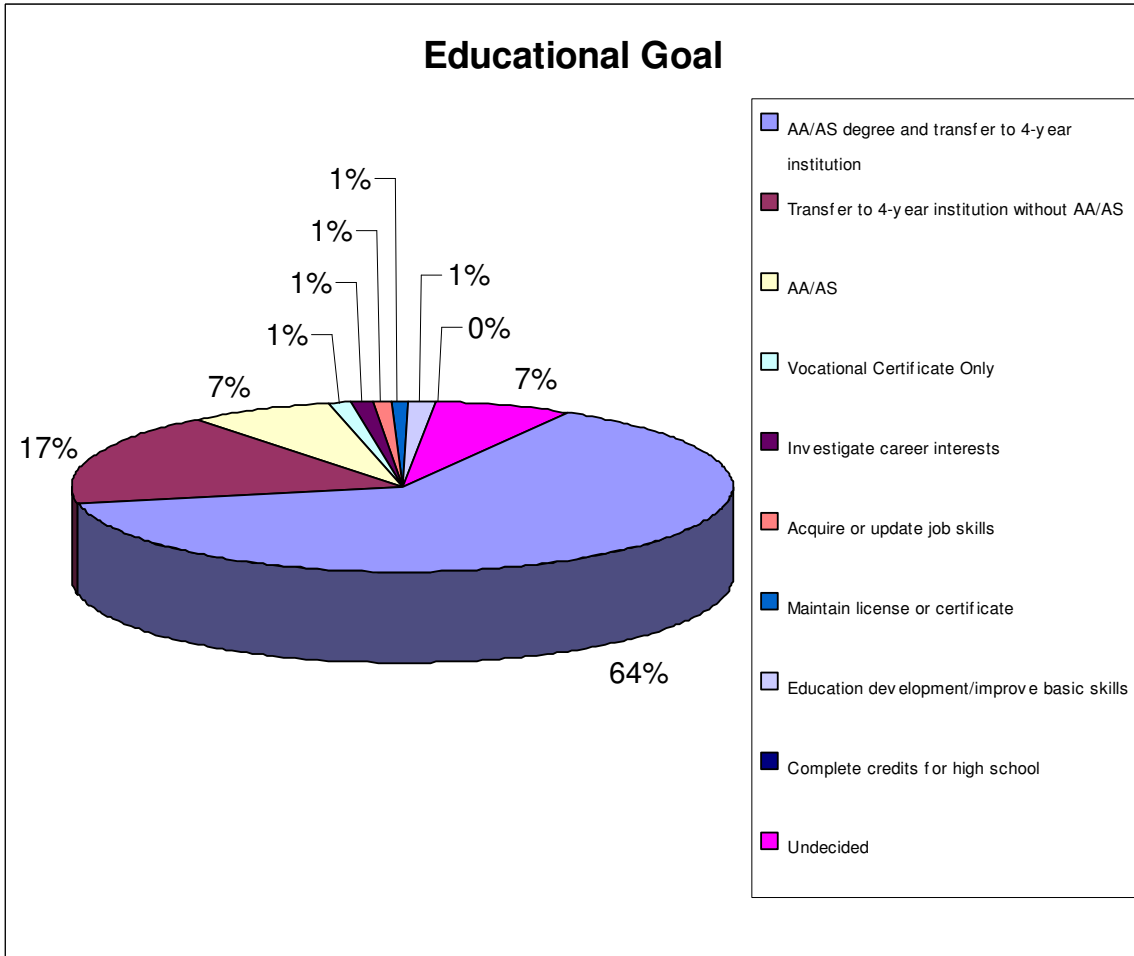
Based on the results of the survey, students in the division who take math courses are composed of 55% females and 45% males. The race/ethnicity of the students tends to reflect the local community. There are 41% White/Caucasian, 14% Black/African American, 28% Hispanic/Mexican American, 7% Asian American/Pacific Islander, 1% Alaskan Native/American Indian, and 9% other.



Most of the students are relatively new to the various programs. Sixty-two percent have taken only one or two math-related classes (including the current one they are in) and 38% have taken 5 or fewer classes. With this high percentage of students who enrolled in math courses, not surprisingly, 66% of the students are full time (more than 12 units).



Over 88% of the students are planning to earn an AA/AS degree, transfer to a four-year institution without an AA/AS degree, or earn an AA/AS degree and then transfer. In fact, 81% currently expect to transfer to a four-year institution. It is somewhat interesting that only 5% of the students are taking courses for vocational, job-related purposes.



3.3 Job placement data are an integral part of the assessment of course and program effectiveness for vocational programs.

While there is no current formal method used to assess student outcomes in the job market, anecdotal information does help the division make necessary adjustments in its offerings. Since no follow-up survey has been administered to past students/graduates, job placement statistics are not available. Local employers are willing to share their observations of our graduates with the dean and faculty. The division attempts to include local school districts as a part of our advisory committees. Also, since the majority of our students currently have jobs, as they continue to take math courses each semester, they regularly provide feedback about the benefits they receive from our math courses.

The Job Placement Center is helpful in providing job sources for many of our students. They offer a very successful Job Fair twice a year that has attracted an ever-increasing number of employers who are interested in hiring our students.

Area 4: PERSONNEL AND SUPPORT SERVICES

4.1 The ratio of full-time to part-time faculty and staff provides students with a quality of instruction, and services consistent with students' needs and goals of the program.

During the Fall Semester 2007, there are 19 full-time and 26 part-time mathematics faculty. The ratio of full-time to part-time faculty is 0.73. Expressed as LHE, this ratio is 267 taught by full-time and 295 taught part-time (267: 295 or 0.93:1). Sixty-two percent of the mathematics courses in the Fall 2007 semester are being taught by full-time faculty and a large proportion is considered as overload. No classes have been cancelled within the past few years because there was no instructor available, the full-time faculty has increased their teaching loads.

All of the classes with Small Assembly Sessions (SAS) which are part of the 2-unit courses Math 50A, 70A, 70B, and 102A are taught by full-time faculty. They supervise students in a computer laboratory setting. Two of the four Math 99 sections (where students can work on Math 50, 60, 70, 80, 102, 130, 135, and 140 at their own pace) are taught by full-time faculty. Students can interact with instructors on an individual basis.

Seventy-two percent of the computer-enhanced classes offered in the EDUCO program are taught by full-time faculty. Six of the seven on-line math classes are taught by full-time faculty.

Part-time faculty provides the majority of instruction for evening classes, Saturday classes, and classes at the Palmdale site.

4.2 The ratio of full-time to part-time faculty and staff provides adequate personnel responsible for program evaluation and revision.

With 19 full-time math faculty members, committees responsible for the evaluation and revision of each course have been developed and operational for 10 years. Specific issues concerning course content and textbook selection are made within these groups and shared directly with the part-time faculty. The part-time are also invited to participate in the activities of these committees.

4.3 There are adequate full-time faculty and staff to meet program needs.

The full-time faculty develop new courses, review and update course outlines of record, and select textbooks. They serve on campus-wide committees. They participate in hiring new faculty and administrators. They serve on tenure and evaluation committees, do most of the evaluations of adjunct faculty, and develop department final examinations in Math 50, Math 60, Math 70, Math 70A, Math 102, and Math 102A. They participate in course assignment and class scheduling.

Since the spring of 2004, 6 new math instructional positions have been created to help keep up with the rapid growth experienced in the mathematics area. The Educational Master Plan [p. 6] states that "...it is further anticipated that additional new positions will be needed to support the mathematics program." We need at least five more mathematics instructors over the next few years. Two new full-time math positions will be requested for Fall 2008.

The ratio of full-time to adjunct instructors in basic skills (Math 50, 60, 70, and 80) is 40%. Basic skills is the fastest growing area at our school. Possible solutions include developing a new discipline in Basic Skills so that qualified instructors not possessing a master's degree in math can teach basic skills in math or incorporating into classes more instructional help from personnel other than instructors such as aides and lab technicians.

4.4 There is adequate support staff to meet program needs.

In July 2006, a half-time Clerical Assistant II position was added to the support staff. In Fall 2007, a Math Science and Engineering Instructional Computer Technician was hired to support divisional instructional computing. This will be very helpful in getting computer problems addressed in a timely manner. A Math Instructional Technician was hired in spring 2007 to work in the open mathematics computer classroom that supports all instruction in mathematics.

The Educational Master Plan [p. 6] states: "To support the administrative needs of the division, there is a need to increase the 50 percent Clerical Assistant II position to 100 percent."

4.5 There are adequate staff development opportunities to enhance the effectiveness of all staff in meeting the goals and objectives of the program as well as the professional development of staff.

Faculty must participate in 60 hours of flexible calendar activities each school year. In addition, professional development opportunities may be obtained through the Faculty Academy, which has been established by the college to provide professional development and resources for faculty in teaching methods, learning styles, curriculum development, student retention, educational technology, and other related areas. Faculty may apply for grants from the Antelope Valley College Foundation for special projects.

Staff development projects have included:

- Attendance at conferences of the College Reading and Learning Association (CRLA) and Association of Colleges for Tutoring and Learning Assistance (ACTLA).
- Courses taken in computer applications, the use of graphing calculators to teach algebra I, algebra II, and trigonometry from Portland State University.
- Attendance at workshops and conferences that promote inquiry-based learning approaches using the graphing calculator, MATHEMATICA, and MAPLE software. This has resulted in training on the use of the graphing calculator and MATHEMATICA for other faculty and students wanting to learn how to use them.
- Attendance at EDUCO workshops in Atlanta and Los Angeles. They then conducted workshops in the use of the EDUCO program here at AVC.
- Courses taken in graduate math at UCLA, CSUN and CSUSB

Flex:

Nine full-time faculty members have made presentations for the Flex Program in the past three years.

Sabbatical leaves

A full-time faculty members had a sabbatical in the Spring 2007 and presented a paper at the Particles, Strings, and Cosmology Conference in London in July 2007 entitled "Geometric Selection of a Unique String Cosmology."

Publications

A full-time faculty member co-authored the Intermediate Algebra book used in the EDUCO program.

Dr. Caproiu edited for students' use the following booklets: Managing Math Anxiety, Math Study Strategies, Math for Nursing, Dosage Calculation

Honors:

A faculty member received Antelope Valley College's highest honor by being designated as "Scholar in Residence" for 2006-2007. She is entered in Cambridge Who's Who 2007. She also received certificates from CRLA, ACTLA, American Society of Biological and Agricultural Engineers, Low Poverty Center, City of Palmdale, and Los Angeles County.

Grants:

- VTEA grant for \$12,500 to help vocational students in Mathematics
- National Science Foundation, Advanced Technical Education Grant, 2004 to 2007. This Pathways program provided inservice training for middle-school mathematics and science teachers. \$350,159
- United State Department of Education. Minority Science and Engineering Improvement Program Grant, October 2006 to October 2009, \$339,120.

Other:

- Faculty have reviewed book galleys for publishers, taught honors courses, written papers on principles and standards for school mathematics and Gardner's Theory of Multiple Intelligences, coordinated the very popular Math and Science Odyssey for middle school students, and the annual Math Field Day that for 26 years has attracted high school mathletes for a robust competition of mathematical skill.

4.6 Full-time faculty are actively involved in the process of hiring and evaluating faculty.

Since the last program review, all hiring's of new full-time and part-time faculty has involved the full-time faculty. Moreover, the full-time math faculty has taken a very active role in the evaluation of new full-time and part-time hires and the ongoing process of routine faculty evaluation.

4.7 The evaluation of staff is systematic and conducted at appropriate intervals. Follow-up to evaluation is timely and systematic.

Evaluation process for nontenured faculty is a four-year process. Committees consist of the dean and one faculty member from within the valuee's division and one from another division. There are strict time-lines for classroom visitations, administration of student and peer evaluations, and for when reports are due. These have all taken place as required.

Adjunct faculty are evaluated at least every three years. Each first-year adjunct faculty member is evaluated in the first semester of service. These evaluations may be done by a faculty member or by the dean. Most are done by full-time faculty. They are up-to-date.

Evaluation of tenured faculty is to occur every three years. There are three evaluation options: peer-team, self, and administrative. The peer-team option is to be used at least every other time. Each peer team has three members: the division dean and two tenured faculty—one from within the evaluatee’s division and one from outside the evaluatee’s division. The mathematics area is behind on full-time tenured evaluations. A schedule is in place to bring them up to date.

In all of the above evaluations, specific comments may be made to indicate areas of improvement to be addressed by the evaluatee.

The Math, Science, and Engineering Division is quite large. Consideration should be given in the future to split it into two or three separate departments to take care of the needs in this area.

4.8 The evaluation processes assess effectiveness and encourage improvement.

The evaluation process is intended to improve instruction. According to the faculty handbook (p. 73) focus is “primarily on the effectiveness with which instructors achieve the stated objectives of their courses or support services and facilitate student learning. Evaluation also will focus on respect for colleagues and the teaching profession and continued professional growth”. The faculty has found this to be a positive process which enables teachers to improve classroom practice and assures quality of instruction across the mathematics curriculum.

Area 5: FACILITIES, EQUIPMENT, & TECHNOLOGY

5.1 Facilities are appropriate for effective teaching, learning, counseling, and/or other services.

Currently we do not have enough classrooms for all math classes at AVC and the number of math classes is limited by the space available. Some of the classrooms in the main campus are in temporary buildings such as the T-900s which will be torn down due to future construction, producing a need for even more space. Until we obtain a separate mathematics facility and/or more classrooms dedicated to mathematics, the number of math classes will be limited by the space available and will not meet the needs of our students. Many more classrooms, with whiteboards, computers and built-in projectors need to be found to adequately meet anticipated growth.

Additional classrooms are available at the Palmdale site to provide access to students wishing to take classes at that location. However there is no DSS (disabled student services) facility available at the Palmdale site – there should be a facility there with a

person to help DSS students with their needs that includes taking tests in a distraction-free environment. Now Palmdale DSS students have to journey to the main campus – that may cause them hardship.

5.2 Equipment and technology are appropriate for effective teaching and learning, counseling, and/or other services.

Some of the classrooms have built-in projectors and computer stations. All classrooms should be equipped with these. Instructors do not have access to portable projectors in all classrooms. There is a need to have student workers (supervised by the IMC) deliver, set up and pick up the portable projectors and/or “smart carts” from the IMC as and when needed. Overhead projectors and classroom layout needs to be examined and re-configured so that the screens and/or lighting is such that the lights shine on the screen. There should be the option for instructor seating while using the overhead.

We have one dedicated computer lab for mathematics (ME 100) and two additional computer equipped classrooms with allocated lab times (APL 204 and SSV 236). The computers in the labs do not meet the needs of the students – there is an immediate need to replace the computers with newer ones to accommodate the requirements of current and future software programs. There is also a shortage of computers and the labs are often crowded and students sometimes have to wait for a computer to become available.

The addition of wireless internet on campus will allow students to access the math software freeing up lab space for students without a portable computer resulting in more efficient use of the lab rooms.

5.3 Program support space is adequate to ensure the effective operation of the educational program and related support activities.

To accommodate the recent growth in the math department, additional offices were allocated to support new faculty. However, the math faculty is dispersed all over campus, making communication and exchange of ideas difficult.

Given the large number of full time math faculty (20), the work room in OF1 is in need of an additional computer.

The adjunct instructors need a designated workroom with computers that will allow them to meet students for office hours and conduct daily preparation work.

5.4 The safety of the facilities and equipment are reasonable and adequate.

All classrooms are not equipped with phones that work. In case of emergency this could pose a problem calling security and a problem for emergency calls coming into the classroom.

The carpeting in APL 204B is torn and could cause someone to trip.

Area 6: FISCAL SUPPORT

6.1 During the period under review, resources have been used effectively to support programs and services.

In addition to funding support from AVC during the period under review, the Mathematics program was recipient of funding support from the first Title V Grant and two Minority Science and Engineering Improvement Program (MSEIP) Grants from the U.S. Department of Education. These funds were used to open two computer labs ME100 and SSV 236 with forty five computers in each, available for student use 35 hours per week in an open lab setting and for classroom instruction. Furniture and computing equipment plus a projection system for both rooms were acquired through Title V and a partnership with LA City College, Department of Mathematics and their MSEIP Grant. A second MSEIP Grant received by AVC has replaced the outdated computers in ME 100 and SSV236. Laptop computers have been purchased which will assist us in using the EDUCO instructional system, when all of our classrooms are fitted with projection systems.

In the development of the competitive MSEIP Grant proposal, the results of the Student Success and Equity Report were used to demonstrate AVC's need for support. As well, the grant report will provide baseline data for the assessment of the outcomes of our efforts to introduce computer technology and the pedagogy of the EDUCO software into basic skills mathematics instruction.

Several instructors have attended workshops in the training of EDUCO instructional software, both here at our own campus, at Los Angeles City College, Los Angeles Valley College, and at Clark Atlanta University, Atlanta, Georgia. The Mathematics, Science and Engineering Division recently hired its own computer technician/troubleshooter, which will reduce our dependence on an overburdened ITS. We have hired a full time Instructional Aid to staff the computer lab ME 100.

6.2 Current and anticipated funding is adequate to maintain high quality programs and services.

We still have two years of funding from the MSEIP grant. We also anticipate leveraging these funds with support from the funds available from the Chancellor's Office Basic Skills Initiative. The introduction of novel teaching methodologies via computer technology has been identified as an effective practice with a positive impact on the acquisition of mathematical skills. We expect to see reduced attrition and increased success rates among all students as a result of improvements put in place by this grant money.

6.3 Anticipated funding is adequate for the development of revised and new programs.

District funds will continue to be adequate to maintain high quality programs and services.

Area 7: COMMUNITY OUTREACH AND PROGRAM AWARENESS

7.1 Staff maintains appropriate links with the community.

The Mathematics Program at AVC is currently involved in various community outreach efforts. Among these are Mathematics Field Day, Math Science Engineering Technology (MSET) Consortium, Pathways Program, and the Math & Science Odyssey.

Mathematics Field Day provides local high school students the opportunity to participate in math contests. It consists of a 90-minute junior-senior competition in which each school enters a team of three students. There is also an 82-minute freshman-sophomore competition, in which each school enters a team of two students. After the competition, lunch is served and awards are presented.

The MSET Consortium was established to grow and maintain a diversified, state-of-the-art technical workforce through high quality math, science, engineering and technology education programs and strong community partnerships. The Consortium is comprised of industry, federal and local governments, academic professionals, and community citizens. The Consortium provides a monthly lecture series and conducts projects like the Virtual Flight Loads Lab and the Robotics Education Project that were conducted at three high schools.

The Pathways program was created to respond to the future need for middle school mathematics and science teachers. It was developed in collaboration with CSUB Antelope Valley campus and local community, government, and industry partners. In the program, students have a carefully planned experience at AVC, including specialized courses using technology-based equipment, field experience coursework in local schools, and opportunities to visit industry, government, and aerospace partner sites. The students then transfer to CSUB Antelope Valley Campus or elsewhere.

In the Math & Science Odyssey, middle school students participate in a series of workshops conducted by AVC faculty, local professionals in Mathematics, Science, and Engineering related fields. The students also participate in a themed contest where students have the opportunity to design and create a project. Workshops are also provided for the middle school teachers. A keynote speaker also provides a presentation of the year's theme followed by lunch and awards.

7.2 Staff makes appropriate efforts to inform the community and students about each program and facilitate student participation in those programs.

The Mathematics program utilizes events and programs such as Mathematics Field Day and the Math and Science Odyssey, the Pathways Program, and those projects created by the MSET Consortium to inform the community and students. This helps stimulate

interest in our Mathematics Program, helps recognize mathematical ability among high school students, and provides the opportunity for the community to participate.

7.3 Where appropriate, advisory committees meet regularly and support the development of programs and services.

Not Applicable.

Area 8: STATE AND FEDERAL COMPLIANCE

8.1 State and Federal Guidelines

There are no state or federal guidelines that pertain specifically to the mathematics program. However, the math faculty does comply with the general guidelines that apply throughout the campus curriculum. That is, the math faculty follows state guidelines for the establishment and enforcement of course prerequisites, the scheduling of courses for the required amount of classroom instruction, regular evaluations of both full and adjunct instructors, and the periodic review of the program itself.

8.2 College Policies and Procedures

The math faculty makes a special effort to comply with the procedures and deadlines of the Office of Admissions and Records. In particular, the math faculty appreciates the importance of meeting deadlines with respect to census data and submitting attendance and grade sheets in a timely manner. The procedures for dropping students, removing "no shows" and accepting new students ("crashers") are also carefully followed by the math faculty.

Program: Physical Sciences

Table 12. Number of Sections Taught in Astronomy, Physics and Physical Science from 2000-01 to 2006-07.

COURSE	ACADEMIC YEAR						
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
ASTR 101 Astronomy	8	11	11	11	13	18	18
ASTR 101L Astronomy Lab.	6	8	9	7	10	14	15
Totals	14	19	20	18	23	32	33
PHYS 100 Physics for Poets	2	1	1				
PHYS 100L Physics for Poets Lab.	2	1					
PHYS 101 Introductory Physics	5	5	5	5	5	5	5

PHYS 101L Introductory Physics Lab.	5	5	5	5	5	5	5
PHYS 102 Introductory Physics	2	1	1	1	1	1	1
PHYS 102L Introductory Physics Lab.	2	1	1	1	1	1	1
PHYS 110 General Physics	3	3	4	3	3	3	2
PHYS 110PS General Physics	3	3	4	3	3		
PHYS 110L General Physics Lab	3	3	4	3	3	3	3
PHYS 120 General Physics	1	1	1	1	1	2	2
PHYS 120PS General Physics	1	1	1	1	1		
PHYS 120L General Physics Lab	1	3	1	1	1	3	2
PHYS 210 General Physics	1	1	1	1	1	1	1
PHYS 210PS General Physics	1	1	1	1	1	1	1
PHYS 210L General Physics Lab	1	1	1	1	1	1	1
Totals	33	31	31	27	27	26	24
PSCI 101 Physical Science	13	14	14	14	13	13	18
PSCI 101L Physical Science Lab.		16	19	19	18	17	16
Totals	13	30	33	33	31	30	34

*No Intersession.

Table16. Number of Sections Taught in Chemistry from 2000-01 to 2006-07.

COURSE	ACADEMIC YEAR						
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
CHEM 101 Introductory Chemistry	9	9	10	10	15	13	18
CHEM 101SA Introductory Chemistry	14	14	16	17	21	20	24
CHEM 101L Introductory Chemistry	14	16	17	18	23	22	27
CHEM 102 Introductory Chemistry Org.	3	2	2	3	4	3	4
CHEM 102L Introductory Chemistry Org.	3	3	2	3	4	3	4
CHEM 110 General Chemistry	7	6	7	5	5	7	6
CHEM 110SA General Chemistry	10	10	10	9	9	11	10
CHEM 110L General Chemistry Lab.	10	10	11	9	9	11	10
CHEM 120 General Chemistry	3	4	3	3	4	3	3
CHEM 120L/SA General Chemistry Lab.	5	8	5	5	5	4	4
CHEM 210 Organic Chemistry	1	1	1	1	2	2	2
CHEM 210L Organic Chemistry Lab.	1	1	1	1	2	2	2
CHEM 220 Organic Chemistry	1	1	1	1	2	1	1

CHEM 220L Organic Chemistry Lab.	4	2	1	1	2	1	1
Totals	85	87	87	86	107	103	116

*No Intersession.

Area 1. CURRICULUM

Course Development

1.1 The curriculum supports the educational objectives of the program/discipline. New and revised courses address changes in the discipline and specifically address student needs.

The Physics, Physical Science, Astronomy program has had an established course sequence that is adequately serving the needs of the students pursuing either an AA/AS degree or looking to transfer to 4-year institution. No new courses have been developed since the last program review.

As indicated in Table 12, course offerings in the Astronomy and Physical Science have doubled from 14 and 13 sections in 2000-01 to 33 and 34 sections in 2006-07, respectively. Course offerings in Physics have declined by 9 sections over the same time period and reflect the shift of students to Physical Sciences and a slight decline in interest in calculus based physics.

Course offerings in Chemistry increased significantly from 85 sections taught in 2000-01 to 116 sections in 2006-07 (Table 16).

The existing course sequence in Chemistry meets the transfer and vocation needs of our students. To further expand the Chemistry offerings two new courses were established using AVC procedures established by the Academic Policies and Procedures Committee (AP&P). These courses are:

- * CHEM 205 Analytical Chemistry. This course is needed for transfer by some chemistry students and related majors. It is a response to needs expressed by both students and businesses such as Rio Tinto Mines, Boron, CA in the community. One of these community partners, the Air Force Research Laboratory, Edwards AFB, donated funds to equip AVC with some of the instrumentation needed to offer a course consistent with modern analytical methods. It is anticipated this course will articulate with the CSU and UC Systems as a transfer course.
- * CHEM 101-OL Introductory Chemistry Online. The lecture portion of Introductory Chemistry has been approved for Technology Mediated Instruction and presentation online through Distance Education. The laboratory and small assembly session are offered on campus. This hybrid offering improves access for students. The platform for this course is Blackboard which is the standard adopted by AVC.

Four additional chemistry courses are being developed:

- * Two new zero unit labs are in preparation to support the laboratory portions of CHEM 210 and 220. This will improve provide organic chemistry students with additional time to complete experiments and opportunities to discuss course content with their instructor increasing student success in 210 and 220. If these courses meet the approval of the Academic Policies and Procedures Committee, one will be held starting in the Fall Semester 2008; the other starting in the Spring Semester 2009.
- * A new environmental chemistry course is in preparation. This will be a GE class and will help establish an environmental science program in the future. Students increasingly express interest in this important field. There is community support for this program through the Mojave Environmental Education Consortium.
- * Also in development is a one-semester introductory chemistry course geared for health science students. Students in this track currently take an introductory course that includes only general chemistry, and then have an option to take a second semester course that covers organic and biochemistry. The revised course, similar to offerings at many other colleges, would enable health science students to learn a little about general, organic, and biochemistry all in one semester.

Course Revision

1.2 All courses are reviewed within a six-year cycle per Title 5, Section 55210(b)(3).

The P/PS/A courses have all be updated to comply with the new Title 5 requirements and the procedures established by the AVC AP&P committee. The list of updated courses includes:

1. Physics 101 (Introductory Physics)
2. Physics 102 (Introductory Physics)
3. Physics 110 (General Physics)
4. Physics 120 (General Physics)
5. Physics 210 (General Physics)
6. Physical Science 101
7. Astronomy 101
8. Astronomy 101 Lab

Significant changes have been made to courses numbered 1-4 and 6 on the above list. Specifically, the courses have been reorganized to incorporate the traditional hands-on activities into a unified schema with the traditional lecture and recitation. Lectures, discussions, and hand-on activities are now blended in a unified effort to improve student learning outcomes. The new approach gives more emphasis on active learning than passive lectures, and is heavily depended on the use of technology. The implementation of this approach is a culmination of the efforts of the program faculty that have been involved in physics/physical science education research for about six years, and follows research based

findings that show significant increase in knowledge gain (Mazur, 1997; Hake, 1998; McDermott & Reddish, 1999)

There were no changes made on the course prerequisites. Physics, Physical Science, and Astronomy faculty are in the process of developing SLOs for all the program courses and plan to complete them within the scheduled timeline established by the college.

The Chemistry courses have all be updated to comply with the new Title 5 requirements and the procedures established by the AVC AP&P committee. The list of updated courses includes:

1. CHEM 101 (Introductory Chemistry Lec., Lab. & SAS)
2. CHEM 102 (Introductory Chemistry Organic Lec. & Lab.)
3. CHEM 110 (General Chemistry Lec., Lab & SAS)
4. CHEM 120 (General Chemistry Lec. & Lab./SAS)
5. CHEM 210 (Organic Chemistry Lec. & Lab.)
6. CHEM 220 (Organic Chemistry Lec. & Lab.)

Other Curriculum Matters

1.3 Courses which have not been taught within a three-year academic period are obsolete and have been removed from the college catalog. Courses which have not been taught within a two-year academic period are inactive and have been identified.

Obsolete courses:

The only course that has become obsolete since the last review is the Physics 100 course, Physics for Poets, which was superseded by the Physical Science 101 course.

No Astronomy and Chemistry courses have been declared obsolete.

Inactive courses:

Not applicable

1.4 Courses address issues related to diversity and/or multicultural perspectives.

Courses taught in the physical sciences relate to the science of the physical world and universe they do not relate to diversity and/or multicultural perspectives. The history of these disciplines however does reflect the cultural influences associated with the evolution of human civilizations.

Program Development and Revision

1.5 New programs developed during the period under review meet students' needs and are consistent with the college mission and ILOs.

The program has remained consistent since the last program review. No new programs have been developed. The courses taught, however, are consistent with the college mission and ILOs.

1.6 Existing programs are revised as needed.

Not applicable

Instruction

1.7 Courses are taught within the parameters described in the outline of record.

The program faculty follows the course outline of record as dictated by Title 5 regulations. Full-time Physics, Physical Science, Astronomy and Chemistry instructors make every effort to communicate the importance of covering the material as described in the outline of record to the part-time faculty. Full-time faculty performs peer evaluations of both full-time and part-time faculty. During the evaluation process we review our peers' syllabi to make sure they are within the parameters described in the Course Outline of Record.

1.8 Faculty and staff use innovative strategies to meet student needs and staff development supports the development of these strategies.

The majority of the courses in the program were revised to incorporate the latest instructional techniques that have been identified by physics/physical science education research to be superior in improving conceptual learning and problem solving abilities (Halloun & Hestenes, 1995; Hake, 1998). A strong component of technology is now embedded in all courses. Program faculty has been successful in securing grants and partnerships that helped fund upgrades in computer and data gathering technology. A list of grant and partnerships is given below:

- 2004- HP Technology for Teaching grant (\$60, 000)
- 2004-NSF Advance Technological Education grant (\$350, 000)
- 2005- HP Technology for Teaching grant (\$118, 000)
- 2006- AVC foundation (\$8,000)
- 2006- Carnegie Scholars grant (\$2,500)
- 2006- US Dept. of Education (multiyear-cooperative grant) (\$3,500,000)

The recently hired full time lab assistant has been instrumental in assisting full-time and part-time instructors in the implementation of the changes mentioned above.

In Chemistry, Honors Options in CHEM 110, 120, and 210 have been developed and offered for students interested in the Honors Transfer Alliance and Honors Program. A full honors section of 110 has also been offered but with low enrollment.

Using wireless computer technology in the laboratories new computer technology including online homework and molecular modeling has been integrated into all Chemistry courses. As well, new student laboratory experiments have been developed and tested.

Laboratory safety has been improved through the collective efforts of laboratory technicians and faculty. Lab safety guidelines were established through the efforts of a safety committee. Reviewed by faculty and facilities personnel, the guidelines are now clearly posted on instructor desks. Setting a standard to wear safety goggles whenever any work is being conducted in the laboratory has made the practice clear and enforceable. Accident report forms, chemical resistant gloves, and additional eyewashes have been placed in lab rooms. A system is being developed for posting material safety data sheets (MSDS) in each lab. Improvements can still be made. Fire extinguisher training has been repeatedly requested without result. A tour of the chemistry stock room to help all faculty become familiar with its features and the locations of instructional materials should be implemented.

References:

Hake, R.R. (1992). Socratic pedagogy in the introductory physics laboratory. *The Physics Teacher*, 30, 546-552.

Halloun, I. A., Hestenes, D. (1987). Modeling instruction in mechanics. *American Journal of Physics*, 55, 455-462.

Mazur, E. (1997). *Peer instruction: A user's guide*. Upper Saddle River, NJ. Prentice Hall.

Valiotis, C. (2005). *The Socratic Method in physics instruction*. Talk presented at the TechEd conference.

Valiotis, C. (2006). Improving science education using the Socratic Method. Talk presented as part of the AVC flexible calendar events.

Scheduling

1.9 Course scheduling provides students with reasonable access to meet their objectives and promotes strong enrollment patterns.

Table 13. Enrollment in Physics from 2003-04 to 2006-07.

	2003-04		2004-05		2005-06		2006-07	
	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
FTES	26.0	24.7	27.0	26.3	30.1	26.5	23.5	24.2
WSCH	802.0	762.8	834.4	813.6	929.6	819.8	724.6	N/A
Enrollment	302.0	283.0	319.0	305.0	172.0	117.0	143.0	N/A
FTEF	1.2	0.9	1.2	0.9	2.6	2.1	1.2	N/A

Table 14. Enrollment in Physical Science from 2003-04 to 2006-07.

	2003-04		2004-05		2005-06		2006-07	
	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
FTES	30.5	31.1	31.0	29.6	24.2	25.9	26.9	23.4
WSCH	940.8	960.0	956.8	915.2	748.8	800.0	832.0	N/A
Enrollment	296.0	302.0	299.0	292.0	238.0	126.0	130.0	N/A
FTEF	1.3	1.4	1.3	1.4	1.3	1.5	1.7	N/A

Table 15. Enrollment in Astronomy from 2003-04 to 2006-07.

	2003-04		2004-05		2005-06		2006-07	
	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
FTES	18.4	29.1	22.0	35.8	43.0	38.2	38.9	38.1
WSCH	569.6	899.2	678.4	1,104.0	1,328.0	1,180.8	1,200.0	N/A
Enrollment	182.0	284.0	213.0	346.0	417.0	370.0	379.0	N/A
FTEF	0.6	0.9	0.7	1.1	1.4	1.4	1.4	N/A

Table 17. Enrollment in Chemistry from 2003-04 to 2006-07.

	2003-04		2004-05		2005-06		2006-07	
	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
FTES	97.7	91.6	99.3	103.4	94.3	94.1	94.6	102.4
WSCH	3,015.6	2,829.0	3,067.4	3,194.6	2,913.0	2,905.0	2,921.4	N/A
Enrollment	1,111.0	1,013.0	1,110.0	1,147.0	851.0	825.0	933.0	N/A
FTEF	3.5	3.6	4.2	4.6	6.0	6.8	4.3	N/A

As evident in Tables 13, 14, 15 and 17, there have been slight declines in the FTES generated in Physics and Physical Science and corresponding increases in Astronomy and Chemistry courses over the period of time from 2000-01 to 2006-07.

Lack of classroom space has somewhat affected course enrollments. In addition, the department relies on part-time faculty to teach night and Saturday courses, and that leads to

scheduling problems due to the limited availability of adjunct instructors. The coordination of the schedule with other disciplines (mathematics or engineering) is not always optimal due to the lack of space and qualified instructors. The problem can be alleviated by a better coordination of the various disciplines that submit their schedule individually. Maybe the scheduling could be done cooperatively.

Enrollment in the chemistry courses is limited by the availability of the 24 seat laboratory sections. At present, because of limited available rooms across campus during prime scheduling times, these labs are also used to support lecture and small assembly sections. It is anticipated the facilities in the new Health and Science Building will provide for a more optimal use of the laboratory space enabling the expansion of the course offerings.

CHEM 101, Introductory Chemistry, is now being taught in an online/hybrid format. The lecture is taught online and the laboratory plus small assembly session are taught on campus. This format of presentation not only provides students with an alternative learning opportunity but will remove lecture sections currently scheduled in the laboratory and provide for a more effective scheduling of laboratory sections.

To maximize the use of existing space, additional sections of the courses with the highest enrollments are being offered at new times (such as a class that meets only on Fridays; a class that meets Monday and Wednesday at 4pm; scheduling a course that used to meet three times a week into twice a week) to see which ones are most popular with students.

Course and Program Support

1.10 Faculty and staff are familiar with and work closely with other Student Services and Academic Affairs faculty and staff in program development and student referral.

To meet the learning needs of our students, Physics, Physical Science, Astronomy and Chemistry work very amicably with all the student support services. The Learning Center has been generous in providing supplemental instructors for chemistry courses, even for courses with low enrollment such as CHEM 210, Organic Chemistry, and CHEM 120, second semester General Chemistry. They also ensure a supply of good tutors available at convenient hours.

When a student requests assistance through Disabled Student Services, faculty has found DSS to be accommodating. They provide note takers, adapted books, interpreters, and exam proctoring service. One small problem with the proctoring service is that the DSS office opens at 8am. For a student enrolled in an 8am class, the instructor must drop off the exam on the day before in order to have it proctored by DSS while the instructor proctors his or her own class.

The Job Placement Center has been instrumental in finding strong candidates to work in the lab.

1.11 Recent developments in instructional technology have been incorporated into courses and student support services consistent with the objectives of the programs and services.

Computer based data acquisition equipment is used to enhance and develop student knowledge of physical principles. The course structure allows for the integration of lecture and labs in a unified curriculum that fosters discovery and critical thinking skills development. Assessment techniques have been developed to measure the effectiveness of the new method. Faculty have found that the new method has resulted in significant increase in student knowledge gain (58%) compared to 24% gain of the control group

Through an Educational Partnership Agreement, the Air Force Research Laboratory has generously supported the acquisition of experimental apparatus compatible with computer technology and used in the physics and physical science laboratories. As well, astronomy has been provided apparatus including a device capable of spectral analysis and a 12 inch reflecting telescope that will be permanently mounted in the new Health and Science building. This equipment will enable students to do some very sophisticated studies of astronomical bodies and events.

Wireless computer access has been established in the three chemistry laboratories and students are able to study computational chemistry using chemistry software such as Spectrum. This has been of special value in General Chemistry (CHEM 110) and Organic Chemistry (CHEM 210). Through an Educational Partnership Agreement, the Air Force Research Laboratory, Edwards AFB has provided a new Fourier Transform-Infrared Spectrophotometer that has been used to conduct analytical studies in General Chemistry (CHEM 120, 110H) and both course in Organic Chemistry (CHEM 210, 220). The AFRL has also provided a new Varian Gas Chromatograph.

With the adoption of Blackboard to support online education, a technology mediated lecture in Introductory Chemistry (CHEM 101) was developed and is now providing students with an alternative way to access instruction.

Instructors have found myAVC and Blackboard to be good outlets for providing students with information and feedback.

1.12 Courses are articulated with institutions of higher education and local high schools.

Our courses are articulated with the University of California and with the California State University. These agreements are maintained by the college's Articulation Officer. We do not articulate any of our courses with the Antelope Valley Joint Union High School District.

The Science Department Chair from Littlerock High School and the Math and Science Representative from the high school district have met with the dean. A memorandum of understanding is being developed that will allow a qualified high school to teacher, i.e. meeting the minimum qualifications for college instruction in chemistry, present the lecture component of General Chemistry (CHEM 110 and CHEM 120) at the high school and the laboratory taught on the AVC campus.

The Dean forms faculty committees that are very active in successful articulation of our courses. All these efforts help in the smooth transition of students from High School to AVC and from AVC to a four-year college. In the future it would be of interest to the faculty to see if an articulation agreement could be arranged with the high school faculty.

The Physics, Physical Science, Astronomy program is currently developing a middle school science teacher supplemental authorization program in collaboration with the Palmdale School District.

1.13 The courses and/or program meet one or more of the primary goals articulated in the College Mission Statement.

The physics, physical science, astronomy and chemistry courses support the college's mission by offering high quality transfer education. Introductory Chemistry is also a prerequisite course for vocational students in the Health Sciences.

1.14 The courses and/or program meet one or more of the college's ILOs.

Every course offered by the Physics, Physical Science, Astronomy and Chemistry programs meets one or more of the college's Institutional Learning Outcomes. Some courses satisfy general education requirements, while others satisfy general education requirements and in addition they are transferable to UC, CSU or both. Moreover, they raise the student's level of awareness of the world in which they live and work.

1.15 The courses and/or program are consistent with plans articulated in the Educational Master Plan.

The Physics, Physical Science, Astronomy and Chemistry program curricula is consistent with the plans articulated in the AVC Educational Master Plan. The Physical Sciences Program offers a wide variety of courses that fulfill many Associate Degree requirements and Certificate requirements, as well as prepare students for transferring to a four-year college in a major such as physics, chemistry, astronomy-astrophysics or engineering. In addition, the program offers course work transferable to many health related programs and general education course work for Liberal Studies majors and future elementary and middle school teachers.

Area 2: STUDENT SUPPORT AND DEVELOPMENT

2.1 The institution provides all prospective and currently enrolled students with current and accurate information about its programs, admission policies, graduation requirements, social and academic policies, refund policies, student conduct standards, and complaint and grievance procedures.

Students feel that the science program is not adequately advertised in the community.

Students and faculty receive a handbook that contains the “Code of Conduct”, pertinent policies, and contact numbers for student support offices. Instructors are encouraged to remind students of key points in the syllabi for their classes.

2.2 The program identifies the educational support needs of its student population and provides appropriate services to address those needs.

Program faculty is monitoring student performance throughout the semester and when necessary they refer students to the Learning Center for help with tutoring and other services. Many of our courses are supported by the Supplemental Instruction program at the Learning Center.

2.3 The program involves students, as appropriate, in planning and evaluating student support and development services.

Students are involved with planning and evaluation via formal surveys and informal discussion. For example, a survey was distributed to General Chemistry (CHEM110 and 120) students this semester to collect their opinions about new textbook products. Informal discussion was held with some General Chemistry (CHEM 110 and 120) students about how important lab experiments, demonstrations, and hands-on activities are to their learning experience.

2.4 Admissions and assessment instruments and placement practices are designed to reduce bias and are regularly evaluated to assure effectiveness.

Faculty frequently observes that students are woefully lacking in the math skills necessary for Introductory and General Chemistry. Some instructors give prospective students a ‘math skills pretest’ on the first day of class to give students an opportunity to self-assess whether they are prepared. Unfortunately, even with this tool, students do not recognize, or perhaps admit, that they are ill-prepared. The chemistry faculty has requested a study to determine whether a math prerequisite should be set for CHEM101. There is currently an advisory of MATH 070 (Elementary Algebra). MATH 102 (Intermediate Algebra) is advised for CHEM110 while Math 130 (College Algebra) or MATH 140 (Precalculus) remains a prerequisite for CHEM 120. A future study could investigate whether a prerequisite of MATH 102 for CHEM 110 would be beneficial for students.

2.5 The program provides appropriate comprehensive, reliable, and accessible services to its students regardless of service location or delivery method.

Currently there are three courses offered online (Physical Science 101, Astronomy 101 and Chemistry 101). The two courses have not been evaluated as to their effectiveness and student performance. Future offerings will depend on the evaluation of the courses. We are not offering courses at the Palmdale location, but as space becomes available we are planning to expand our course offering there.

Night and Saturday students are not as well served as daytime students. Having a laboratory technician available at these times would provide help for the instructor and students.

Due to the amount of specialized equipment and chemicals needed for laboratory portions of the chemistry classes, it is currently not possible to offer chemistry at the Palmdale location of Antelope Valley College. However, some innovative arrangements have been made. To reduce the commuting burden for students, the lecture portion of CHEM 101 is now being offered online. These students need only come to the AVC campus for lab work. Through partnership with Littlerock High School, AVC's CHEM 110 and 120 will be offered at the Littlerock campus for advanced high school chemistry students. For teachers participating in a supplemental authorization program to increase the number of highly qualified science teachers in the Palmdale School district, CHEM 101 will be offered at a classroom within that district. Ideally, the success of these programs will encourage development of similar arrangements to share resources among local educational institutions for the benefit of students.

2.6 The institution, in keeping with its mission, creates and maintains a campus climate that serves and supports its diverse student population.

Antelope Valley College is a Hispanic serving institution with approximately 28% of the student body self-identifying with this group. Chemistry faculty has been involved with efforts to increase the number of students from this and other underrepresented groups in the sciences. Efforts include working with programs for current college students such as the High Achievers Club and the Pathways to Engineering and Pathways to Teaching Mathematics and Science programs (supported by a Title V grant). Efforts to reach prospective students include the ICAN program (supported by Title V) for high school juniors and seniors, Math/Science Odyssey for 8th graders, and support of college outreach activities such as the "I'm Going to College" event for 4th and 5th graders.

The American Chemical Society provides scholarships for qualifying students from underrepresented populations. Faculty informs students of this opportunity.

Students who qualify for Federal Work study or CalWORKS support are encouraged to work in the chemistry lab to gain experience that may open their eyes to opportunities in the science. During the three-year funding period of the Pathways to Teaching Mathematics and Science program, students from underrepresented populations who did not qualify for those aid programs were also able to be paid to work in the laboratory setting.

2.7 The institution supports a co-curricular environment that fosters intellectual, ethical, and personal development for all its students and encourages personal and civic responsibility.

The chemistry department has offered honors general chemistry courses and honors options for students enrolled in regular general chemistry courses. The Honors Program promotes academically well-rounded, civic-minded, personal growth

2.8 Student records are maintained permanently, securely, and confidentially, with provision for secure back up of all files.

Program faculty keeps electronic and hard copy student records for at least three years. Electronic copies are stored on the AVC server.

2.9 The program systematically evaluates the appropriateness, adequacy, and effectiveness of its student services and uses the results of the evaluation as a basis for improvement.

The Physics, Physical Science, Astronomy and Chemistry faculty are poised to revise teaching methods, textbooks, and laboratory experiences. Input from program review will be a valuable guide.

Area 3: STUDENT LEARNING OUTCOMES

3.1 Expectations for student learning outcomes are clearly articulated and actual student learning outcomes are used in the assessment of course and program effectiveness.

Program faculty have established SLOs for all courses and are working on PLOs. We anticipate that they will be completed within the college’s requested deadlines. Assessments are also being written and data will be collected from those assessments.

3.2 Student evaluations are an integral part of the assessment of course and program effectiveness.

In the Fall 2007 semester, 203 students were surveyed (53% male and 47 % female) (Table 18). 87% of them were within the age range of 18-24 years old, and 87% are seeking to transfer with or without an AA/AS degree. The racial /ethnic make up is 46% white, 28 % Hispanic, 11% Black/African American, and 8% Asian American. When considering only physics students, the Asian Americans are 18% and the Black/African American students make up only 3%. 86% of the students took between 1 to 5 courses at AVC, which suggests that they are only in their first year of attendance at AVC. The argument is strengthened by the fact that 66% of them declared full time status. Student responses on items 8 to 21 are listed below:

Table 18. Student Survey Fall 2007 Physics, Physical Science and Astronomy

Question	Physics		Astronomy		Phys Sci		Totals		
		%		%		%		%	
2: Gender	Male	39	67%	45	50%	24	44%	108	53%
	Female	19	33%	45	50%	31	56%	95	47%
3: Age	15-17	4	7%	5	6%	1	2%	10	5%
	18-20	29	49%	52	58%	28	50%	109	53%
	21-24	12	20%	24	27%	14	25%	50	24%

	25-30	8	14%	6	7%	3	5%	17	8%
	31-39	5	8%	1	1%	2	4%	8	4%
	40-49	1	2%	2	2%	7	13%	10	5%
	50-59	0	0%	0	0%	1	2%	1	0%
	60+	0	0%	0	0%	0	0%	0	0%
4: Educational Goal	Trnsf w/ AA/AS	24	42%	55	60%	42	75%	121	59%
	Trnf w/o AA/AS	27	47%	19	21%	12	21%	58	28%
	AA/AS only	1	2%	7	8%	1	2%	9	4%
	Voc Cert	0	0%	0	0%	0	0%	0	0%
	Interest	0	0%	0	0%	0	0%	0	0%
	Skills	2	4%	0	0%	1	2%	3	1%
	Lice/Cert	1	2%	0	0%	0	0%	1	0%
	Ed dev/BS	0	0%	1	1%	0	0%	1	0%
	HS credit	0	0%	0	0%	0	0%	0	0%
	Undecided	2	4%	9	10%	0	0%	11	5%
5: Race	AN/AI	0	0%	1	1%	0	0%	1	0%
	AA/PI	11	18%	4	4%	1	2%	16	8%
	B/AA	2	3%	12	13%	9	16%	23	11%
	H	17	28%	23	26%	17	30%	57	28%
	W/C	27	44%	43	48%	26	46%	96	46%
	Other	4	7%	7	8%	3	5%	14	7%
6: # of courses	1-2	15	25%	58	64%	39	70%	112	54%
	3-5	30	51%	24	26%	11	20%	65	32%
	6-10	8	14%	5	5%	2	4%	15	7%
	11+	6	10%	4	4%	4	7%	14	7%
7: Status	FT	47	80%	58	64%	30	54%	135	66%
	PT	12	20%	33	36%	26	46%	71	34%
	SA	13	22%	35	40%	21	39%	69	35%
	A	42	71%	45	52%	28	52%	115	58%
8: Course offerings meet my needs	D	3	5%	1	1%	3	6%	7	4%
	SD	1	2%	2	2%	1	2%	4	2%
	NA	0	0%	4	5%	1	2%	5	3%
9: Requirements for crt. programs or AA degree are clear and easy to understand	SA	14	24%	20	23%	15	27%	49	24%
	A	27	46%	48	55%	34	61%	109	54%
	D	8	14%	8	9%	5	9%	21	10%
	SD	1	2%	3	3%	0	0%	4	2%
	NA	9	15%	8	9%	2	4%	19	9%
10: Courses contribute personal and professional development	SA	14	24%	15	17%	18	33%	47	23%
	A	26	44%	49	56%	29	53%	104	52%
	D	9	15%	12	14%	3	5%	24	12%
	SD	1	2%	2	2%	1	2%	4	2%
	NA	9	15%	9	10%	4	7%	22	11%
11: Courses are	SA	17	29%	23	27%	18	32%	58	29%

relevant and up to date	A	41	69%	57	66%	31	55%	129	64%
	D	1	2%	2	2%	5	9%	8	4%
	SD	0	0%	1	1%	0	0%	1	0%
	NA	0	0%	3	3%	2	4%	5	2%
12: The programs prepares me for career/future education	SA	12	20%	19	22%	13	24%	44	22%
	A	35	59%	37	44%	27	49%	99	50%
	D	10	17%	15	18%	9	16%	34	17%
	SD	0	0%	3	4%	2	4%	5	3%
	NA	2	3%	11	13%	4	7%	17	9%
13: Days and times of scheduled courses meet my needs.	SA	14	24%	32	37%	13	23%	59	29%
	A	20	34%	44	51%	32	57%	96	48%
	D	19	32%	7	8%	5	9%	31	15%
	SD	5	8%	1	1%	5	9%	11	5%
	NA	1	2%	2	2%	1	2%	4	2%
14: Courses that I am interested are offered frequently enough	SA	9	15%	18	21%	13	23%	40	20%
	A	13	22%	40	46%	22	39%	75	37%
	D	28	47%	21	24%	14	25%	63	31%
	SD	7	12%	1	1%	5	9%	13	6%
	NA	2	3%	7	8%	2	4%	11	5%
15: Classrooms meet my needs	SA	10	17%	25	29%	15	27%	50	25%
	A	39	66%	49	56%	36	64%	124	61%
	D	5	8%	11	13%	1	2%	17	8%
	SD	3	5%	1	1%	2	4%	6	3%
	NA	2	3%	1	1%	2	4%	5	2%
16: Computer labs meet my needs	SA	9	15%	20	23%	16	29%	45	22%
	A	31	53%	41	47%	24	43%	96	48%
	D	9	15%	7	8%	3	5%	19	9%
	SD	3	5%	2	2%	2	4%	7	3%
	NA	7	12%	17	20%	11	20%	35	17%
17: Equipment and materials meet my needs	SA	15	26%	23	26%	18	32%	56	28%
	A	31	53%	51	59%	33	59%	115	57%
	D	8	14%	4	5%	1	2%	13	6%
	SD	2	3%	2	2%	2	4%	6	3%
	NA	2	3%	7	8%	2	4%	11	5%
6: Promotion by instructors regarding educational and career opportunities meets my needs	SA	13	22%	23	26%	16	28%	52	26%
	A	34	58%	47	54%	32	56%	113	56%
	D	6	10%	9	10%	2	4%	17	8%
	SD	0	0%	1	1%	0	0%	1	0%
	NA	6	10%	7	8%	7	12%	20	10%
19: Program support staff are helpful and courteous	SA	15	25%	22	25%	16	28%	53	26%
	A	34	58%	46	53%	26	46%	106	52%
	D	2	3%	5	6%	1	2%	8	4%
	SD	0	0%	1	1%	3	5%	4	2%
	NA	8	14%	13	15%	11	19%	32	16%

20: Lab Techs are knowledgeable and courteous	SA	12	21%	22	25%	11	20%	45	22%
	A	22	38%	39	45%	30	54%	91	45%
	D	2	3%	4	5%	1	2%	7	3%
	SD	1	2%	0	0%	1	2%	2	1%
	NA	21	36%	22	25%	13	23%	56	28%
21: There is adequate publicity about this program in the community	SA	7	12%	19	22%	8	14%	34	17%
	A	26	44%	36	41%	23	41%	85	42%
	D	16	27%	21	24%	10	18%	47	23%
	SD	5	8%	2	2%	2	4%	9	4%
	NA	5	8%	9	10%	13	23%	27	13%

Special attention should be paid on the responses of items 13 and 14 (schedule of course and frequency of offerings) which drew the largest percentages of disagreement. Students obviously wanted to convey their dissatisfaction with the way courses are scheduled and the frequency that they are offered especially in physics.

A similar student survey was conducted in all chemistry classes and the results are presented in Table 19.

Table 19. Student Survey Fall 2007 Chemistry

		Chemistry	%
2: Gender	Male	33	38%
	Female	54	62%
3: Age	15-17	5	6%
	18-20	39	51%
	21-24	18	23%
	25-30	10	13%
	31-39	3	4%
	40-49	2	3%
	50-59	0	0%
	60+	0	0%
4: Ed Goal	Trnsf w/ AA/AS	41	53%
	Trnf w/o AA/AS	27	35%
	AA/AS only	3	4%
	Voc Cert	0	0%
	Interest	1	1%
	Skills	2	3%

	Lice/Cert	1	1%
	Ed dev/BS	0	0%
	HS credit	0	0%
	Undecided	2	3%
5: Race	AN/AI	1	1%
	AA/PI	20	22%
	B/AA	5	6%
	H	14	16%
	W/C	31	34%
	Other	19	21%
6: #courses	1-2	29	33%
	3-5	34	39%
	6-10	16	18%
	11+	9	10%
7: Status	FT	61	68%
	PT	29	32%
	SA	42	48%
	A	38	43%
8: Course offerings meet my needs	D	2	2%
	SD	3	3%
	NA	3	3%
9: Requirements for crt. programs or AA degree are clear and easy to understand	SA	24	28%
	A	50	58%
	D	7	8%
	SD	1	1%
	NA	4	5%
10: Courses contribute personal and professional development	SA	32	37%
	A	44	51%
	D	3	3%
	SD	0	0%
	NA	7	8%
11: Courses are relevant and up to date	SA	41	47%
	A	41	47%
	D	0	0%
	SD	0	0%
	NA	5	6%
12: The programs prepares me for career/future education	SA	38	45%
	A	39	46%
	D	5	6%
	SD	1	1%
	NA	2	2%
13: Days and times of scheduled courses meet my needs.	SA	23	27%
	A	43	51%
	D	14	16%
	SD	3	4%
	NA	2	2%

14: Courses that I am interested are offered frequently enough	SA	10	12%
	A	38	45%
	D	30	35%
	SD	5	6%
	NA	2	2%
15: Classrooms meet my needs	SA	32	37%
	A	48	56%
	D	3	3%
	SD	1	1%
	NA	2	2%
16: Computer labs meet my needs	SA	24	28%
	A	34	40%
	D	4	5%
	SD	2	2%
	NA	22	26%
17: Equipment and materials meet my needs	SA	28	32%
	A	52	60%
	D	3	3%
	SD	1	1%
	NA	3	3%
18: Promotion by instructors regarding educational and career opportunities meets my needs	SA	26	35%
	A	36	49%
	D	3	4%
	SD	1	1%
	NA	8	11%
19: Program support staff are helpful and courteous	SA	24	32%
	A	33	45%
	D	3	4%
	SD	0	0%
	NA	14	19%
20: Lab Techs are knowledgeable and courteous	SA	21	25%
	A	36	43%
	D	1	1%
	SD	0	0%
	NA	26	31%
21: There is adequate publicity about this program in the community	SA	13	18%
	A	29	39%
	D	14	19%
	SD	4	5%
	NA	14	19%

3.3 Job placement data are an integral part of the assessment of course and program effectiveness for vocational programs.

Not applicable

Area 4: PERSONNEL AND SUPPORT SERVICES

4.1 The ratio of full-time to part-time faculty and staff provides students with a quality of instruction, and services consistent with students' needs and goals of the program.

There are currently only three full time faculty members supporting the program; one for each of the disciplines (physics, physical science, and astronomy). The program has also 7 part-time faculty who usually teach the night and Saturday courses.

Currently Chemistry has four full-time faculty members. This still leaves nearly 40% of the teaching load to be covered by part-time and overload instruction by full-time faculty. It is suggested that an additional full-time member be hired by the time the new Science building opens in the Spring Semester 2012.

4.2 The ratio of full-time to part-time faculty and staff provides adequate personnel responsible for program evaluation and revision.

The ratio of full-time to part-time faculty and staff in each discipline is adequate for program evaluation and revision. Each program or course can be evaluated or revised by a full-time faculty member.

4.3 There are adequate full-time faculty and staff to meet program needs.

So far, the number of faculty supporting the program has been sufficient, however as the program expands and enrollment increases, more full time faculty will be needed. The problem is exacerbated by the fact that qualified part-time faculty are difficult to recruit. It is hoped that the recent expansion to four full-time faculty members in Chemistry will allow time to develop a new course covering the specific needs of Health Sciences students.

4.4 There is adequate support staff to meet program needs.

The program currently has adequate technical support staff to meet its daytime needs. However, the late afternoon and Saturday courses have historically been under served by the lack of available support staff. The college is encouraged to hire support staff to cover a range of science laboratories scheduled during late afternoon, evenings and on Saturdays.

Student workers are a valuable resource. Their efforts are highly visible in terms of housekeeping as well as extra help in set up and clean up of laboratory experiments. While these mundane tasks are a drain on the laboratory technician's time to attend to other laboratory needs, students can actually benefit from the experience while they are providing a needed service.

The addition of a computer technician to the Mathematics, Science and Engineering Division has been a boon to the physical sciences and chemistry programs. Courses in these programs rely on wireless network access, specific computer programs, and printing capability. The current computer technician is capable of servicing these programs, but needs more permission/authority, from ITS to perform needed tasks to better serve instruction in the division and these programs.

4.5 There are adequate staff development opportunities to enhance the effectiveness of all staff in meeting the goals and objectives of the program as well as the professional development of staff.

Faculty takes advantage of professional opportunities for performance improvement. They attend workshops, conferences and professional society meetings so that they stay current in their field.

Staff development opportunities are adequate for faculty. The chemistry lab tech would like to have additional training opportunities.

Additional offerings of training for myAVC could help with communication among faculty and with students.

Faculty members actively pursue professional development. Some have attended the American Chemical Society national convention to keep up with scientific and educational advances.

Other examples include:

- Participation with the SOAR High School Team at the Fall 07 Early College High School Conference sponsored by the Foundation of California Community Colleges.
- Participation in review of proposals at the National Science Foundation for funding of mathematics and science teacher training programs. This gave greater insight into grant writing process, funding concerns, and best practices for science teacher education.

4.6 Full-time faculty are actively involved in the process of hiring and evaluating faculty.

Full-time faculty has been actively involved in the process of hiring and evaluating faculty.

4.7 The evaluation of staff is systematic and conducted at appropriate intervals. Follow-up to evaluation is timely and systematic.

Evaluation of full time and part-time faculty, as well as staff is performed at regular intervals and in a timely manner.

Faculty are thoroughly evaluated by students, faculty, administrators and staff at the intervals delineated in AVC policy. Pilot evaluation forms are being tested.

Classified staff is evaluated by the division dean with input from faculty in accord with AVC policy.

4.8 The evaluation processes assess effectiveness and encourage improvement.

More attention could be given to constructive input. The tenure committee is effective for non-tenured, newer faculty. The similar mechanisms for tenured and adjunct faculty evaluations are also effective. However, because these are done at three-year intervals, more frequent communication among department members in the interim would foster exchange of ideas and suggestions for improvement. Department members should also strive to recognize evaluation as an opportunity to become even better than they already are. Some instructors have expressed their opinion that evaluation is a waste of time because they already know that they are excellent instructors. Although they may well be excellent instructors already, everyone should be open to new ideas and embrace the opportunity to discuss the state of the art with peers. Perhaps they have not received constructive input in previous evaluations. Perhaps they view evaluation as a periodic event rather than a continuous process. Conducting student evaluations every semester, as suggested in the Tenure and Evaluation article of the AVC policy would be one way for instructors to grow accustomed to feedback.

Area 5: FACILITIES, EQUIPMENT, & TECHNOLOGY

5.1 Facilities are appropriate for effective teaching, learning, counseling, and/or other services.

At present the program in Physics and Physical Science is space limited and essentially taught in one laboratory. Program faculty members have been involved in the planning and design of the new Health and Science Building scheduled to be completed by 2009. The new building will eliminate or alleviate the current needs for additional laboratory and lecture space for the expansion of the program.

Since lecture and small assembly sessions are frequently scheduled in laboratory space, because additional space is not available on campus, there is not enough lab space to meet the demand for the Introductory Chemistry course (CHEM 101). The new Health and Science Building will have a joint use Physical Science/Chemistry laboratory that will alleviate some of that problem.

Instrumentation used in the analytical facets of chemistry are not currently conveniently accessible to students. Most instruments are located in a faculty office; another in the chemistry stock room. The new building includes a dedicated instrument room, which will be safer for students to use, and afford more security for the equipment.

5.2 Equipment and technology are appropriate for effective teaching and learning, counseling, and/or other services.

Currently, the equipment and technology used in the P/PS/A courses is state of the art and more than adequate. Equipment is maintained by program faculty and staff. Laptop computers are used over a wireless network and have provided students with the abilities to capture and analyze experimental data and to search the internet for supplemental information. Computer issues are addressed as needed by the Division Computer Technician and ITS staff.

Chemistry has received new instrumentation via the U.S. Air Force, Air Force research laboratory. This will allow us to use modern instrumentation in the laboratories.

There are some older donated Gas Chromatographs which we have never been operated at AVC. The college may need to hire a tech to setup and maintain unusual technology such as this. Or, hire specialist on short-term contracts for such work.

This may be repetitive, but the division computer technician should be allowed more “permission” to maintain existing equipment and suggest appropriate equipment upgrades to match programs and instrumentation.

The Chemistry faculty has been looking forward to the anticipated installation of projection systems and screens in each laboratory. It is hoped that the screens will be placed to still permit use of the white board when the screens are down.

5.3 Program support space is adequate to ensure the effective operation of the educational program and related support activities.

The utilization of the laboratory and lecture space for the P/PS/A lectures and laboratories is approaching capacity. The same situation exists for the Chemistry program as lab space is used for small assembly sessions and lecture. Part-time staff could use an office area to hold office hours. Improved “general faculty computer(s)” could be provided in this office / work room area. With the recent addition of temporary buildings housing offices for full-time

faculty, it is hoped that the work areas previously used by these faculty could be used by adjunct faculty.

5.4 The safety of the facilities and equipment are reasonable and adequate.

Additional fire extinguishers were requested nearly a year ago and still not installed. A small laboratory fire had clearly shown the need to add extinguishers.

Response time for repairs (including critical ones like leaking gas lines or broken door locks) are too slow and sometimes no response is made.

Faculty also needs to be vigilant about general safety in student laboratories and security. Despite reminders from the dean about the importance of these issues, doors are still found unlocked.

Area 6: FISCAL SUPPORT

6.1 During the period under review, resources have been used effectively to support programs and services.

The program's fiscal needs have been adequately addressed every year since the last review. The biggest expenses incurred were the hiring of a full time lab assistant, and the equipment modernization for the physics/physical science lab. This was possible due to external help from grants and partnerships as described in 1.8. The college has assumed the cost of the maintenance of the equipment as part of its yearly budget.

6.2 Current and anticipated funding is adequate to maintain high quality programs and services.

The College has been able to provide sufficient funding to purchase essential pieces of equipment and to provide the laboratory courses with consumable supplies. In some years Prop 20 funds have been able to diminish the impact of a short fall in district funding. This has been experienced in this current academic year and it is anticipated increasing costs for materials will require additional district funding in future years.

The Air Force Research Laboratory (AFRL) at Edwards AFB has provided some special equipment funding. Additional funding from Hewlett-Packard, National Science Foundation, and U.S. Department of Education Title V grants has supplemented the program.

Community members also contribute in-kind support. Rio Tinto Mines donated approximately \$70K worth of glassware and supplies. AFRL maintains an Educational Partnership Agreement with AVC through which they donate chemicals and supplies.

6.3 Anticipated funding is adequate for the development of revised and new programs.

It is anticipated that sufficient district resources and funding will be available to support the introduction of Analytical Chemistry CHEM 205.

Area 7: COMMUNITY OUTREACH AND PROGRAM AWARENESS

7.1 Staff maintains appropriate links with the community.

The program has established various strong links with the community:

1. Program faculty is active members of the Math, Science, Engineering, and Technology Consortium that includes members from local industry and government.
2. Faculty is offering summer training workshops to high school and middle school science teachers.
3. Faculty is in close contact with the Project Lead the Way teams at local high schools: Highland H.S., Lancaster H.S. and Pete Knight H.S.
4. Faculty work closely with the AVC outreach department and represent the program in many community events.

Program Faculty and Staff have participated during the eight Bohn-Meyer Math and Science Odysseys. This event hosted on the AVC campus brings eight-grade middle school students to the campus. The students participate in a themed contest where students have the opportunity to design and create a project. Workshops of discovery and experience are provided for the students and also the teachers. The later workshops with teachers are intended to enhance their classroom abilities. A keynote speaker also provides a presentation of the year's theme followed by lunch and awards.

7.2 Staff makes appropriate efforts to inform the community and students about each program and facilitate student participation in those programs.

Some outreach occurs to numerous science community partners. One faculty member volunteers with the Restoration Advisory Board dealing with the environmental cleanup at Edwards AFB. The Air Force Research Lab has an active Educational Partnership Agreement with AVC. Professional contact is maintained with NASA Dryden Flight Research Center, the Math, Science, Engineering, and Technology Consortium, Rio Tinto Mines, the Air Force Flight Test Center, the Mojave Environmental Education Consortium, Boeing, Lockheed-Martin, Lehigh Cement Plant, Lancaster Sherriff's Station Crime Lab and the Palmdale Water District. These organizations sometimes have opportunities available for students, request information from the college, or share resources with AVC.

In the area of educational links, dialogue with the staff at CSUB-AV and CSUF Engineering Program is ongoing. Connections with teachers and personnel in the districts of AV High School District, Lancaster Schools, Eastside Schools, Palmdale Schools, and Koeppl Schools are in place. These districts keep AVC informed of paid and volunteer opportunities for

students and pre-service teachers. Other exchanges include in-class presentations, collaborations on grant writing, and sharing resources.

To keep contacts current, periodic effort should be made to inform partners of new developments. The science partners may be interested to hear about CHEM 205, while the educational partners may be interested in CHEM 101 on-line.

7.3 Where appropriate, advisory committees meet regularly and support the development of programs and services.

Not Applicable.

Area 8: STATE AND FEDERAL COMPLIANCE

8.1 State and Federal Guidelines

The P/PS/A and Chemistry disciplines are compliant with all State and Federal Guidelines.

In the lab, in addition to instruction in good chemical hygiene, current lab and safety procedures are to be taught to students and encouraged in all staff and faculty (i.e. responsible disposal and/or treatment of generated waste). This is in line with Federal EPA and CalOHSa regulations.

8.2 College Policies and Procedures

The P/PS/A and Chemistry disciplines are compliant with all College Policies and Procedures.

PROGRAM: GEOSCIENCES

The Geosciences Program can be currently be grouped into 3 sections; Geography, Geology, and Geographic Information Systems (GIS). A new discipline Earth Sciences has been developed and will be taught for the first time in the Fall semester 2008.

Area 1: CURRICULUM

Course Development

During the past 6 years enrollment in geosciences classes increased reaching a plateau then declined slightly. Table 20 shows that the numbers of sections taught in Geography and Geology

courses has increased from 23 and 4 sections in 2000-01 to 46 and 11 sections, respectively in 2006-07. In 2004-05 the number of geography sections taught was 54. The decline since then is in part due to staffing problems, specifically under qualified adjuncts. Some sections were cancelled due to lack of instructors.

Table 20. Number of Sections Taught in the Geosciences from 2000-01 to 2006-07.

COURSE	ACADEMIC YEAR						
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
GEOG 101 Physical Geography	9	9	11	12	16	13	11
GEOG 101L Physical Geography Lab.	7	9	9	9	11	9	9
GEOG 102 Weather and Climate	1	2	1	2	2	1	3
GEOG 102L Weather and Climate Lab.					1		2
GEOG 105 Cultural Geography			3	8	11	5	9
GEOG 106 California Geography	1	2		1	2		1
GEOG 201 Map Interpretation							3
GEOG 205 Intro. Geographic Info. Systems	2	4	3	4	4	3	3
GEOG 220 Data Acquisition & Mgmt. GIS		1	2	1	1	1	1
GEOG 221 Spatial Analysis in GIS	1		1	1	1	1	
GEOG 222 Cartography for GIS	0		1	1	1		1
GEOG 298A,B,C Spec. Studies in GIS	0	1	2	2	3	2	2
GEOG 299 Special Topics: Field Geography	2	4	1	1	1	1	1
Totals	23	32	34	42	54	36	46
GEOLOG 101 Physical Geology	2	4		4	4	6	6
GEOLOG 101L Physical Geology Lab.	2	4		4	4	4	4
GEOLOG 102 Historical Geology					1	1	1
Totals	4	8	4	8	9	11	11

* No Intersession.

1.1 The curriculum supports the educational objectives of the program/discipline. New and revised courses address changes in the discipline or industry and specifically address student needs.

All geosciences classes are transfer and/or associates degree applicable courses. No basic skills course work or non-credit course work is offered at this time.

Since 1998 several new geography classes have been created including GEOG 106 California Geography, GEOG 201 Map Interpretation & GPS, GEOG 229 Field Geography, and GEOG 102L Weather & Climate Lab. GEOG 101 & 102, Physical Geography and Weather and Climate

respectively, were substantially revised to be more distinctive and eliminate overlap. All geography courses have been updated. The geology courses are either up-to-date or have been updated.

With the placement of GEOG 105 Cultural Geography under the administration of the Mathematics, Science and Engineering Division, all geosciences courses are now part of the division.

Online Courses

Geography 101, 102 and 102 L, and Geology 101 have been offered online

Palmdale Campus

Geography 101, 101L and 105 have been offered at the Palmdale campus

Honors Sections or Options

One section of Geography 101 was offered as an honors class. Geography 101 and 105 are available with an honors option.

A locally approved certificate in Geographic Information Systems (GIS) was established in 2001. About 20 students have completed the certificate. The certificate consists of 15 units or 5 classes focusing on learning GIS applications. This program has been revised and following regional approval has been forwarded to the Chancellor's Office for approval as a Certificate of Achievement.

No community education classes are offered.

New Courses

Geography

Weather & Climate Lab, GEOG 102L
California Geography, GEOG 105
Map Interpretation & GPS, GEOG 201
Field Geography, GEOG 299

GIS

Data Acquisition & Management, GEOG 220
Spatial Analysis, GEOG 221
Cartography, GEOG 222
Special Topics in GIS, GEOG 298

Geology

No new courses were developed

Earth Sciences

Introduction to Earth Sciences, ERSC 101

These new courses support the objectives of providing a variety of breadth of options to satisfy general education requirements and increased industry demand for trained GIS professionals. Introduction to Earth Sciences has been approved by the AP&P Committee and will be taught for the first time in the Fall Semester 2008. This course will provide a transfer course for students in the Liberal studies degree program at CSU, Bakersfield and other schools in the California State University System.

These courses were developed and the curriculum was designed by reviewing similar course offerings at other institutions, consultation with involved educators and professionals. An advisory committee was consulted in the development of the GIS certificate program.

Geog 220, Geog 221, Geog 222 and Geog 298 have the prerequisite of Geography 205, Introduction to GIS. The software specific skills acquired in Geography 205 are necessary for success in the more advanced courses.

Enrollment is limited in the GIS classes due to the intensive nature of faculty student interaction and software expense for the more advanced GIS functions.

The new and existing courses support student needs & the college mission.

Areas in which new courses are being considered include the formation of an Environmental Sciences curriculum that would include an Introduction to Environmental Sciences course. This program would also incorporate existing or future multidisciplinary courses such as Environmental Biology, Environmental Chemistry, Environmental Geology, and Environmental Technologies. The development of this curriculum would enable the college to meet and fulfill future needs for educating and training individuals for what promises to be a rapidly growing field of technology and societal interest, including but not limited to ongoing and future environmental restoration work at nearby Edwards Air Force Base. The Environmental Sciences curriculum would also be linked to the existing GIS program as GIS is an important tool in data collection, assessment and interpretation, and is in widespread use across numerous disciplines. In addition to Environmental Geology, additional Geology courses being considered include a course on California Geology, and a field geology course. These would expand the college's ability to prepare students for transfer to four-year institutes, as well as offer local residents the opportunity to learn more about California's natural resources and compliment the college's existing California Geography course.

Faculty has developed SLOs for Geography, Geology, and Earth Science courses, and the courses in the GIS Certificate Program. Program Learning Outcomes are now being developed.

Course Revisions

1.2 All courses are reviewed within a six-year cycle per Title 5, 55210(b)(3).

Geography

Physical Geography: Earth's Surface Landscapes, GEOG 101

Physical Geography: Earth's Surface Landscapes Lab, GEOG 101L

Physical Geography: Earth's Weather & Climates, GEOG 102L
Cultural Geography, GEOG 105

GIS

Introduction to GIS, GEOG 205

Geology

Historical Geology, GEOL 102

Geography 101, 101L & 102 were substantially revised to each be more distinctive and eliminate overlapping subject areas.

Geography 205 was substantially revised to reflect a major change in software functionality, to better reflect current practices in the discipline and the addition of a supporting Map Interpretation course.

Geography 105 was substantially revised to better reflect current practices in the discipline and to hopefully satisfy the diversity requirement.

Geology 102 was substantially revised to better reflect current practices in the discipline.

Other Curriculum Matters

1.3 Courses which have not been taught within a three-year academic period are obsolete and have been removed from the college catalogue. Courses which have not been taught within a two-year academic period are inactive and have been identified.

Not applicable.

1.4 Where appropriate, courses address issues related to diversity and/or multicultural perspectives.

According to AVC's current diversity policy Geography 105 and 106 do not qualify. At most other community colleges these course satisfy the diversity requirement.

The school policy should be revised to include these courses.

Program Development and Revisions

1.5 New programs developed during the period under review meet students' needs and are consistent with the college mission and ILOs.

New courses and the revision to the GIS Certificate Program are consistent with the college mission and ILOs.

1.7 Existing program are revised as needed.

The locally approved GIS Certificate Program has been revised into a Certificate of Achievement. It has been approved by the AP&P Committee, the regional Vocational Program Committee and has been forwarded to the Chancellor’s Office for final approval.

Instruction

1.7 Courses are taught within the parameters described in the outline of record.

Adjunct and new fulltime instructors are provided with examples of syllabi, teaching materials and tests. New faculty is also provided direction on the use of the Course Outline of Record in the preparation of their course syllabi while attending the New Faculty Orientation Program.

1.8 Faculty and staff use innovative strategies to meet student needs and staff development supports the development of these strategies.

Most faculty members have transitioned to using electronic presentations and other media formats in their course presentations.

Most faculty members also take advantage of the ability to post files, links and other resources on myAVC. AVC has adopted Blackboard for online class management so students have uniformity in the organization of online classes.

A new computer technician position was added to the Mathematics, Science and Engineering Division in the summer of 2007 under the supervision of the division dean. This position is to support computer based instruction in the division classrooms and laboratories. The technicians ability to support the geosciences and division as a whole has been limited by ITS and it is hoped additional access to computer equipment and ancillary equipment like printers will be granted. The ability of this technician to provide prompt knowledgeable service will greatly enhance the GIS Program and all computing in the division.

Scheduling

1.9 Course scheduling provides students with reasonable access to meet their educational objectives and promotes strong enrollment patterns.

Table 21. Enrollment in Geography from 2003-04 to 2006-07.

	2003-04		2004-05		2005-06		2006-07	
	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
FTES	51.5	60.4	63.8	66.3	58.4	51.4	47.2	55.9
WSCH	1,590.4	1,865.6	1,971.2	2,048.0	1,804.8	1,587.2	1,458.0	N/A

Enrollment	500.0	588.0	620.0	640.0	570.0	499.0	457.0	N/A
FTEF	1.4	1.7	2.2	2.3	1.8	1.6	1.4	N/A

Geology 22. Enrollement in Geology from 2003-04 to 2006-07.								
	2003-04		2004-05		2005-06		2006-07	
	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
FTES	20.3	16.9	19.1	15.2	24.2	18.6	26.2	20.8
WSCH	627.2	521.6	588.8	470.4	748.8	572.8	809.6	N/A
Enrollment	200.0	163.0	184.0	149.0	234.0	179.0	253.0	N/A
FTEF	0.6	0.5	0.6	0.5	0.7	0.6	0.7	N/A

Attempts have been made to offer core classes in each time block and on a MW or TR , Sat sequence. Geography classes have offered at the Palmdale Campus as well. These core classes generally have sufficient enrollment. As evident in Tables 21 and 22, enrollment patterns in the Geography courses have declined slightly and there has been an increase in FTES in the Geology courses.

Non-core classes are challenging to schedule due to limitations on the availability of qualified instructors, however attempts are made to offer alternatives whenever possible.

Although the Introduction to GIS, GEOG 205, classes have low enrollment we attempt to offer both day and night sections each semester. This allows full-time students and local residents that work during the day the opportunity to take the course. The instructor for GEOG 220, Data Acquisition and Management, and GEOG 221, Spatial Analysis, is only available during the evenings, thereby limiting class offerings.

Course and Program Support

1.10 Faculty and staff are familiar with and wok closely with other Student Services and Academic Affairs faculty and staff in program development and student referral.

All of the Geosciences faculty members interact most closely with the following centers of learning assistance:

DSS – Provides support for students with disabilities. They do a very good job and are easy to work with. They contribute to the success of students with physical and/or learning disabilities.

Learning Center: Tutoring – Provides peer tutoring support for students. Most semesters there have been tutors available in geography. Most instructors encourage students to take advantage of this service. This is very successful and beneficial promoting student success.

Library – Provides research materials and instruction for students. They are very successful. Students appreciate online access to research materials.

Counseling – Provides advice to students for timely and successful completion of requirements. There is dissatisfaction among students with this service. Counselors are unfamiliar with less popular majors and career options such as GIS and are generally unable to provide students with information concerning these career paths.

ITS – Technical support for instruction, especially GIS, has been an absolute disaster. For several semesters the instructors themselves provided the technical support to install and maintain the software. During the semesters when ITS had responsibility, the computers would be non-functional for as much as one quarter of the class session. This stems in part from the fact that ITS does not have sufficient staff that are familiar with the software, and the specialized hardware and software accessibility requirements of the GIS program. However, part of the problem is also the desire of ITS to control accessibility rights to the computers, and attempts to run the software across the college network. While that control has its advantages and is probably appropriate for most computers available to the general student population, it severely limits the operation and functionality of the GIS software.

Technology in Instruction

1.11 Recent developments in instructional technology have been incorporated into courses and student support services consistent with the objectives of the programs and services.

Most faculty members have transitioned to using electronic presentations and other media formats in their course presentations. The availability of internet access in lecture rooms and labs make it possible to use 'live' Internet feeds or access information and incorporate that data into presentations 'on the fly'. This permits the faculty to use up-to-date information and incorporate events that are occurring at the time into their lectures.

Most faculty members also take advantage of the ability to post files, links and other resources on myAVC. AVC has also adopted Blackboard for online class management so students have uniformity in the organization of online classes. However, file size limitations in Blackboard limit the ability to post lecture power point presentations, which generally exceed Blackboard's capabilities.

Several geosciences courses are now offered as online classes, and plans to offer more are being discussed by the faculty.

Articulation

1.12 Courses are articulated with institutions of higher education and local high schools. There is generally less familiarity with the specialized majors and career courses. It is costly to work out formalized articulation agreements when only a few students may be involved. As a result, articulation of many specialized courses is informal.

The high schools are establishing courses in GIS and we would like to establish an articulation agreement. The GIS faculty is working closely with the Regional Occupations Program of the Antelope Valley Joint Union High School District to develop a pathway for high school students into the college Certificate of Achievement program.

Most GIS coursework is offered as upper division work at the CSUs. Some schools are reluctant to accept these courses. This is a national articulation problem and is being addressed by a national panel of community college GIS instructors.

Release time for faculty to work on articulation would benefit students and allow the programs to be more successful.

College Mission

1.13 The courses and/or program meet one or more of the primary goals articulated in the College Mission Statement.

All geosciences courses support the college mission statement by providing high quality educational opportunities for associates degree and transfer students. Students seeking certification in GIS, workforce preparation and development or individuals seeking personal and professional development can benefit from these courses.

1.14 The courses and/or program meet one or more of the college's ILOs.

All geosciences courses have had SLOs written for them and those SLOs align with the Institutional Learning Outcomes (ILOs) and reflect overall institutional effectiveness in the education process. We strive to determine our effectiveness through continuous assessment of course objectives and SLOs.

1.15 The courses and/or program are consistent with plans articulated in the Educational Master Plan.

All geosciences courses are consistent with plans articulated in the Educational Master Plan. They will play a significant role in the development of a program of study in Environmental Sciences.

Area 2: STUDENT SUPPORT AND DEVELOPMENT

Not applicable

Area 3: PROGRAM AND STUDENT LEARNING OUTCOMES

3.1 Expectations for student learning outcomes are clearly articulated and actual student learning outcomes are used in the assessment of course and program effectiveness.

Student Learning Outcomes have been developed for each course in the geosciences. Assessment tools have been identified and will be used to determine course and program effectiveness.

3.2 Student evaluations are an integral part of the assessment of course and program effectiveness.

Each semester all faculty members have students evaluate the courses offered in the geosciences. As well, as part of Program Review a Student Survey was conducted in all geosciences courses. The results are found in Table 23.

Table 23. Student Survey Fall 2007 Geosciences: Geography and Geology

		Geog	%	Geol	%	Totals	%
Question 2: Gender	Male	46	53%	21	38%	67	47%
	Female	41	47%	35	63%	76	53%
						143	100%
3: Age	15-17	4	5%	1	2%	5	3%
	18-20	48	55%	27	49%	75	52%
	21-24	14	16%	14	25%	28	20%
	25-30	7	8%	6	11%	13	9%
	31-39	1	1%	4	7%	5	3%
	40-49	10	11%	2	4%	12	8%
	50-59	3	3%	1	2%	4	3%
	60+	1	1%	0	0%	1	1%
						143	100%
4: Ed Goal	Trnsf w/ AA/AS	50	57%	39	70%	89	62%
	Trnf w/o AA/AS	21	24%	12	21%	33	23%
	AA/AS only	5	6%	2	4%	7	5%
	Voc Cert	3	3%	0	0%	3	2%
	Interest	1	1%	0	0%	1	1%
	Skills	3	3%	0	0%	3	2%
	Lice/Cert	1	1%	1	2%	2	1%
	Ed dev/BS	0	0%	0	0%	0	0%
	HS credit	0	0%	0	0%	0	0%
	Undecided	3	3%	2	4%	5	3%
						143	100%
5: Race	AN/AI	2	2%	0	0%	2	1%
	AA/PI	6	7%	6	11%	12	9%
	B/AA	9	10%	3	6%	12	9%
	H	15	17%	13	24%	28	20%
	W/C	39	45%	30	56%	69	49%
	Other	16	18%	2	4%	18	13%
						141	100%
6: #courses	1-2	54	62%	44	80%	98	69%
	3-5	22	25%	8	15%	30	21%

	6-10	7	8%	1	2%	8	6%
	11+	4	5%	2	4%	6	4%
						142	100%
7: Status	FT	56	65%	36	67%	92	66%
	PT	30	35%	18	33%	48	34%
						140	100%
8: Course offerings meet my needs	SA	30	34%	22	40%	52	37%
	A	55	63%	28	51%	83	58%
	D	1	1%	2	4%	3	2%
	SD	0	0%	2	4%	2	1%
	NA	1	1%	1	2%	2	1%
						142	100%
9: Requirements for crt. programs or AA degree are clear and easy to understand	SA	25	29%	13	24%	38	27%
	A	47	54%	28	51%	75	53%
	D	8	9%	8	15%	16	11%
	SD	2	2%	2	4%	4	3%
	NA	5	6%	4	7%	9	6%
						142	100%
10: Courses contribute personal and professional development	SA	19	22%	15	27%	34	24%
	A	55	63%	25	45%	80	56%
	D	7	8%	8	15%	15	11%
	SD	1	1%	3	5%	4	3%
	NA	5	6%	4	7%	9	6%
						142	100%
11: Courses are relevant and up to date	SA	31	36%	18	33%	49	35%
	A	50	57%	34	62%	84	59%
	D	6	7%	1	2%	7	5%
	SD	0	0%	1	2%	1	1%
	NA	0	0%	1	2%	1	1%
						142	100%
12: The programs prepares me for career/future education	SA	18	21%	12	22%	30	21%
	A	51	59%	26	47%	77	54%
	D	9	10%	10	18%	19	13%
	SD	5	6%	3	5%	8	6%
	NA	4	5%	4	7%	8	6%
						142	100%
13: Days and times of scheduled courses meet my needs.	SA	23	26%	20	36%	43	30%
	A	52	60%	30	55%	82	58%
	D	7	8%	3	5%	10	7%
	SD	4	5%	1	2%	5	4%
	NA	1	1%	1	2%	2	1%
						142	100%
14: Courses that I am interested are offered frequently enough	SA	17	19%	12	21%	29	20%
	A	47	53%	29	52%	76	53%
	D	19	22%	9	16%	28	19%
	SD	5	6%	4	7%	9	6%

	NA	0	0%	2	4%	2	1%
						144	100%
15: Classrooms meet my needs	SA	23	26%	19	34%	42	29%
	A	54	61%	36	64%	90	63%
	D	9	10%	1	2%	10	7%
	SD	0	0%	0	0%	0	0%
	NA	2	2%	0	0%	2	1%
						144	100%
16: Computer labs meet my needs	SA	21	24%	8	14%	29	20%
	A	38	44%	25	45%	63	44%
	D	6	7%	2	4%	8	6%
	SD	6	7%	2	4%	8	6%
	NA	16	18%	19	34%	35	24%
						143	100%
17: Equipment and materials meet my needs	SA	14	16%	17	31%	31	22%
	A	53	62%	29	53%	82	58%
	D	12	14%	5	9%	17	12%
	SD	3	3%	1	2%	4	3%
	NA	4	5%	3	5%	7	5%
						141	100%
18: Promotion by instructors regarding educational and career opportunities meets my needs	SA	19	22%	10	18%	29	20%
	A	50	57%	33	59%	83	58%
	D	12	14%	4	7%	16	11%
	SD	1	1%	1	2%	2	1%
	NA	5	6%	8	14%	13	9%
						143	100%
19: Program support staff are helpful and courteous	SA	18	21%	15	27%	33	23%
	A	48	55%	25	45%	73	51%
	D	5	6%	2	4%	7	5%
	SD	0	0%	0	0%	0	0%
	NA	16	18%	14	25%	30	21%
						143	100%
20: Lab Techs are knowledgeable and courteous	SA	13	15%	9	16%	22	15%
	A	42	48%	23	41%	65	45%
	D	6	7%	2	4%	8	6%
	SD	2	2%	1	2%	3	2%
	NA	24	28%	21	38%	45	31%
						143	100%
21: There is adequate publicity about this program in the community	SA	10	11%	12	21%	22	15%
	A	36	41%	20	36%	56	39%
	D	25	29%	9	16%	34	24%
	SD	7	8%	4	7%	11	8%
	NA	9	10%	11	20%	20	14%
						143	100%

3.3 Job placement data are an integral part of the assessment of course and program effectiveness for vocational programs.

All students who have completed the GIS Certificate Program have been able to find employment in the field if desired. Employed students have been able to improve career opportunities.

Area 4: PERSONNEL AND SUPPORT SERVICES

4.1 The ratio of full-time to part-time faculty and staff provides students with a quality of instruction, and services consistent with students' needs and goals of the program.

Full-time part time ration has improved with the hiring of a new fulltime Earth Science instructor but classes have been cancelled due to lack of qualified instructors. In the Fall Semester 2007 base on LHE, 24 were taught by full-time faculty while 37 were taught by part-time faculty resulting in a ratio of 0.65:1.

4.2 The ratio of full-time to part-time faculty and staff provides adequate personnel responsible for program evaluation and revision.

There is not enough full time staff to stay abreast of program evaluation and course revisions. Adjunct and new faculty are asked to perform more than they should be to support the geosciences and GIS programs.

4.3 There are adequate full-time faculty and staff to meet program needs.

There are very few qualified geographers, geologists and GIS specialists available to teach as adjunct, especially during the day time. As a result staffing is questionable, under prepared instructors are hired and students suffer.

4.4 There is adequate support staff to meet program needs.

A new computer technician has recently been hired by the Math, Science & Engineering Division specifically to address the computer issues for the Division. The new MS&E computer tech has not been granted access to the software, nor do they have sufficient administrative rights to access the computer operating systems to update and/or maintain the GIS computers. Consequently, the effectiveness of this position has been substantially compromised by the unwillingness of ITS to allow him to perform his duties. In spite of the fact that the existing ITS staff is undermanned and not properly trained to maintain the GIS computers, ITS continues to limit accessibility and control over the GIS computers and software. This has resulted in very serious issues associated with technical support and computer maintenance for the GIS program specifically and the geosciences program in general.

4.5 There are adequate staff development opportunities to enhance the effectiveness of all staff in meeting the goals and objectives of the program as well as the professional development of staff.

There are adequate funds available for staff development but time is a great limitation. Release time for faculty to prepare grant applications, perform program development and outreach would allow the Geosciences, especially GIS to grow.

4.6 Full-time faculty are actively involved in the process of hiring and evaluating faculty.

The geosciences full-time faculty members are involved in all faculty interviews and hires. They also actively contribute to faculty evaluations.

4.7 The evaluation of staff is systematic and conducted at appropriate intervals. Follow-up to evaluation is timely and systematic.

The geosciences faculty has been evaluated according to college policies.

4.8 The evaluation processes assess effectiveness and encourage improvement.

The evaluation process is considered by all to be a constructive process.

Area 5: FACILITIES, EQUIPMENT AND TECHNOLOGY

5.1 Facilities are appropriate for effective teaching, learning, counseling, and/or other services.

Currently geosciences courses are being taught in lecture halls, the geology lab, and in the GIS computer lab. In those instances where lectures are in lecture halls or the GIS computer lab, adequate computer facilities, internet access, and presentation equipment (VHS video and DVD) are available. In other instances geosciences lectures are being taught in the geology lab requiring the instructors to provide a computer in order to use Power point presentations or other technology. The geology lab has been equipped with a LCD projector so that presentations can be made if the instructor has a computer or is showing a video/DVD. However, there is no internet access in the geology lab. The GIS courses are currently being taught in a computer lab in the SSV building. Open access to those computer by the general student population has presented problems when non-GIS students get on the GIS computers and start making changes to the computers.

New geology labs, lecture halls, and a GIS computer lab containing up-to-date computers, presentation and display equipment, and internet access are being included in the new Health & Science Building currently in the planning stage.

Transferring the GIS computers and facilities to existing CAD computer labs (APL 204a and 204b) should be considered until the Health & Science building is completed. That would be an improvement over the existing room, SSV 236 in the Student Services building, and better utilize the existing computer facilities in the CAD labs. Non-computer based lectures should not be scheduled in rooms designed for computer use. Students are distracted and often ‘play’ on the computers instead of paying attention to lectures. There should be some type of off-switch that can disable all computers in a room so that the instructor does not have to go around and turn each computer off or compete against improper use of computers during lecture periods.

5.2 Equipment and technology are appropriate for effective teaching and learning, counseling, and/or other services.

Presentation equipment such as LCD projectors and VHS/DVD players in use by most of the geosciences courses is adequate. Internet access is becoming more popular and necessary as ‘live’ data and presentations are often accessed during class presentations. However, wired internet access is not available in all facilities where classes are being taught, and wireless is not available on campus. The existing computer hardware equipment in use for the GIS courses is woefully underpowered and out of date. The existing computers barely meet the minimum operating requirements for the GIS software, and in many instances, are completely inadequate. This results in extremely long wait periods while the computers redraw or render the maps being used and generated, or in some instances specific GIS functions and operations can not be completed. Furthermore, the insistence by ITS to keep data on network servers and not locally in servers in the GIS lab makes it difficult to run advanced GIS functions due to the large size of files and the resulting extended wait times for data transfer across the network. Printers either do not work, or are accessible by other students and/or staff. This often results in the development of a print job que that prevents GIS students from being able to print class assignments because all of the paper is being used or has been used by non-GIS or even non-school related print jobs.

It is presumed that new, more powerful graphics-enhanced computers, and support equipment such as printers, plotters, and digitizers will be purchased and available for use by the geoscience courses when the new Health & Sciences building is completed. The new H&S building should also be equipped with wireless internet access, or at least all rooms should be wired for internet access. All faculty members should have a dedicated printer in their office, or at least a network printer within easy walking distance from their office. Computer access to GIS drives should be automatically set up for faculty teaching those courses.

New high powered workstation computers designed specifically for graphic intensive applications should be purchased and made available for the GIS courses as a local area network (LAN). Those computers should not be accessible to the general student population, but rather be restricted to use by the GIS/CAD courses. Those computers should also be set up so they have internet access, and be linked to a local GIS server, but should not on the general college

network. Support equipment such as printers, plotters and digitizers should be limited to accessibility by only those courses and not open to the general college population. Appropriate instructors and the Mathematics, Science and Engineering computer techs should be given administrative rights to those computers so that updates and fixes can be addressed without delays, which commonly occur under the current ITS policy.

5.3 Program support space is adequate to ensure the effective operation of the educational program and related support activities.

Currently program support space is barely adequate to address the existing staff. Some full-time faculty has offices so inadequate there is no room to hold meetings with students. Full-time faculty is spread across the campus and often has to walk across campus to retrieve print jobs. Part-time adjunct faculty do not have any office space and must share the division common room with other faculty and staff for tasks such as grading, computer work, or student meetings or make-up work, or take advantage of other facilities on campus. Classified staff must share the same common work room with the adjunct and full-time faculty

It is not known what plans for support space are being considered in the college's Education Master Plan; however, new facilities are planned for the new Health and Sciences Building.

There are a number of small office spaces that are currently unused or occupied by full-time faculty in trailers T-500 and T-501. Larger offices should be located on campus for those full-time faculty, and the trailers spaces should be made available for part-time adjunct faculty, who in many instances are using their vehicles as their offices. Adjunct faculty could also share office space since they commonly aren't present on campus at the same times.

5.4 The safety of the facilities and equipment are reasonable and adequate.

The safety of the facilities and equipment are reasonable and adequate.

Area 6: FISCAL SUPPORT

6.1 During the period under review, resources have been used effectively to support programs and services.

Career Technical Education funds and VTEA funds have been acquired in support of the GIS Program. Funding allocated to purchase computers, related equipment and software has been misspent or poorly spent by ITS. Most recently a substantial amount of money was spent by ITS on "blade technology" that was inadequate and unable to support GIS functions it was purchased for. These funds were from a CTE grant and have not been returned to MSE. As a result the GIS program is making due with an insufficient number of underpowered inadequate computers. This has and continues to seriously compromise student success.

The stranglehold placed by ITS on approval of and purchase of all computers and software by the AVC campus has resulted in the purchase of equipment that is inadequate to perform as needed. This is especially true of highly specialized software applications such as GIS.

6.2 Current and anticipated funding is adequate to maintain high quality programs and services.

Funding of release time for program enhancement would be valuable. The GIS program suffers from low enrollment because students are unaware of the opportunities available and that such a program exists at AVC. As well, the failure of the college to meet the technical needs of this program has discouraged student enrollment.

Some VTEA funds have been spent to support the GIS program and a NSF ATE grant proposal is being considered to build the GIS program.

6.3 Anticipated funding is adequate for the development of revised and new programs.

The GIS program needs to establish a location until the new H&S building is completed. The requirements for this lab are as follows:

The GIS lab must operate in a standalone environment not part of a larger network. This is typical of high performance complicated software applications. GIS software can not run across a network. This results in serious performance issues including very slow rendering, rastering and a high rate of errors. The GIS software must be loaded individually on each machine. The nature of the GIS software requires substantial permissions for each operator. Administrative rights on each computer are required by the software. Unique logins and passwords for both GIS administrators and students are needed. Support for the GIS lab and all related equipment such as printers, plotters, scanners, etc. must be maintained by the MSE computer technician. This lab must be wireless as well.

A separate set of laptops with “GIS lite” must be created. These laptops will be used for classes such as geography, geology labs, environmental biology, and other courses that wish to use prepared GIS activities on an occasional basis.

Area 7: COMMUNITY OUTREACH AND PROGRAM AWARENESS

7.1 Staff maintains appropriate links with the community.

Although the staff attempts to maintain links with the community there are serious time limitations. One or two individuals can only do so much.

7.2 Staff makes appropriate efforts to inform the community and students about each program and facilitate student participation in those programs.

Community outreach and program awareness would be vastly improved by allowing release time to faculty. GIS had an advisory committee but meetings have not been scheduled for several semesters due to lack of time.

7.2 Where appropriate, advisory committees meet regularly and support the development of programs and services.

The GIS Advisory Committee has not met recently. The program has however been working closely with the ROP in Palmdale to define a new pathway for students into this exciting career field.

NSF ATE Grant Proposal

The purpose of the Geospatial Technology Program (GST) and Database Center is to inform students about careers in geospatial technologies, provide pathways from high school to colleges and universities, expand and integrate existing technical vocational fields into a two-year degree program, establish a regional public geodatabase to support local educational programs and provide a resource center for industry. This project will utilize the Math, Science, & Engineering Division assets and resources at Antelope Valley College (AVC), and its distinguished project partners and collaborators, which includes members from Edwards Air Force Base, the USFS, Angeles National Forest, the City of Lancaster, Antelope Valley Air Quality Management District (AVAQMD), Rosamond Water District, Mohave Environmental Educational Consortium (MEEC), and Lockheed Martin, who are all committed to supporting this collaborative effort.

To achieve these objectives, the GST and Database Center will implement a variety of strategies which include: 1) increase awareness of career opportunities and applications in geospatial technologies, 2) formalize articulation between high schools, two-year colleges, and four-year institutions, 3) develop additional courses which incorporate geospatial technologies hands-on and project based learning, 4) create a new 2-year degree program in Geospatial Technologies which will include Geographical Information Systems (GIS), remote sensing, surveying, Computer Aided Design (CAD), and mapping, 5) create and maintain a regional GIS geodatabase. These strategies are designed to provide technical training, career enhancement, and raise matriculation rates of continuing GST students to four-year institutions.

Area 8: STATE AND FEDERAL COMPLIANCE

8.1 State and Federal Guidelines

Other than the meeting of the GIS Advisory Board, the geosciences faculty has adhered to all state and federal guidelines.

8.2 College Policies and Procedures

Other than the meeting of the GIS Advisory Board, the geosciences faculty adheres to all college policies and procedures.

SUMMARIES AND RECOMMENDATIONS

Current Student Demand

Demand for courses in the Division had increased consistently over the past four academic years and 538, 598, 627, and 827 courses sections have been taught during the Fall-Spring semesters of 2003-04, 2004-05, 2005-06 and 2006-07 respectively. Particular enrollment pressures have been exerted upon courses such General Biology (BIOL 101), Introductory Chemistry (CHEM 101) and the basic skills Arithmetic courses (MATH 050) and many of these sections close before the beginning of semester instruction.

Students have significant difficulties enrolling in General Human Anatomy (BIOL 201) and General Human Physiology (BIOL 202). General Anatomy is a gateway to the other requisite courses needed for application to the ADN Nursing Program. It closes within days of the opening of registration and a great many students attempt to “crash” the course. These difficulties in enrollment are a function of our inability to schedule additional sections because laboratory space is not available. The Anatomy and Physiology laboratory SC2 140 is fully scheduled from 7:45 a.m. Monday morning to Saturday afternoon at 2:20 p.m. (22 laboratory sections). It is noteworthy to indicate that General Microbiology (BIOL 204) has also experienced significant enrollment pressure and additional sections have been scheduled. The ability to further expand this course is limited by our ability to support the technical needs of laboratory instruction, i.e. available incubators, refrigerators for storage, preparative space and electrical power to the building.

With respect to all other courses, including high demand courses such as Arithmetic (MATH 050), General Biology (BIOL 101,101L) and Introductory Chemistry (CHEM 101, 101SA, 101L) there is some opportunity to expand our offerings to meet student demand; however, our ability to add sections on the Lancaster campus is limited as competition between all college divisions for available time slots/rooms increases as they respond to the respective student demands for their programs. This competition will limit offerings on the Lancaster campus and require the further expansion of the Palmdale site. With respect to the 201 and 202 courses, sections maybe scheduled for late Saturday and Sunday afternoons. However, Sunday instruction has yet to be considered.

Anticipated Student Demand

As our overall college enrollment increases, there will be commensurate increases in the demands for basic skills mathematics, the general education courses needed for transfer, courses aligned with transfer as a junior with a defined major and those courses supporting the Associate Degree Nursing Program, LVN Program, Respiratory Care and Radiological Technology i.e. BIOL 101-101L, 201-201L, 202-202L, 204-204L and CHEM 101-101SA-101L.

It is readily apparent there will be a need for additional sections of basic skills mathematics: Arithmetic (MATH 050) (Fall05-22 sections taught; Spring06-27; Summer06-13; Fall06-31; Spring07-26). As well, as student success in this course increases, sections of additional

sequential skill building courses will have to be added to the schedule. These courses include Prealgebra (MATH 060), Elementary Algebra (MATH 070), Geometry (MATH 080) and Intermediate Algebra (MATH 102). Recent experiences in the basic skills math courses has indicated that ‘time-on-task’ has become a very important factor for student retention and success in these courses. Use of computer based software to provide additional supportive instruction and practice during class time has proven to be very effective.

As well, General Biology (BIOL 101-101L) is experiencing some student enrollment pressure (Fall05-28 lab sections taught; Spring06- 28; Fall06-31; Spring07-31). It is also evident Introductory Chemistry (CHEM 101, 101SA, 101L) is going to see an increase in demand.

Recommendations to Support Current Enrollment

Personnel

To achieve its mission, the Division of Mathematics, Science and Engineering currently comprises 109 faculty members. These include 40 full-time (43 percent) and 69 adjunct faculty (63 percent) members resulting in a full-time faculty to part-time ratio of 0.58:1 and it is apparent that with the hiring of new full-time faculty there has been a corresponding need to hire new adjunct faculty. Of the 39 full-time faculty members (one was on medical leave), 34 taught overload or over the required 15 lecture hour equivalents (LHE). The distribution of faculty within the disciplines is presented in the table below.

Faculty Discipline	Full-time	Adjunct
Astronomy	1	1
Biology	10	11
Chemistry	4	7
Drafting		2
Engineering	1	2
Geography	1	5
Geology	2	2
Mathematics	19	31
Physics	2	2
Physical Science	1	3
Totals	40	69

Based on an analysis of enrollment trends, three new full-time faculty positions in Mathematics, Chemistry and Earth Science were filled for the Fall Semester 2007. During the Fall Semester 2007, two new positions in Mathematics and General Biology were approved for the Fall Semester 2008. As well because of high overloads taught in Anatomy, Physiology and Microbiology plus the difficulties in attracting part-time faculty to these positions additional full-time positions were approved for Fall Semester 2008 appointments.

To support the administrative and instructional responsibilities of the division, the classified personnel include:

- 1-Administrative Assistant
- 1-50 percent Clerical assistant II approved to 100% in Fall 2007
- 2-Biological Science Technicians
- 1-Chemistry Technician
- 1-Physical Science Technician
- 1-Mathematics Instructional Aid
- 1-Computer Technician

The Division continues to need a full-time laboratory technician to support the afternoon-evening offerings in the Science laboratories. At present, afternoon and evening faculty are essentially on their own should a technical issue arise. As well Saturday laboratory instruction in biology and chemistry is without direct technical support.

To support the administrative needs of the division, the 50 percent Clerical Assistant II has been approved for conversion to 100 percent. This however will occur when the Division of Health Sciences hires their full-time Clerical Assistant II.

Equipment

The laboratory and computing equipment needed to support instruction receives a great deal of use and occasionally abuse. It is imperative to provide students and faculty with a safe functional facility and equipment that will enable them to meet the needs of their courses. Some of the most pressing issues include:

- Replacement of student chairs in the SC1 laboratories-72 chairs.
- Replacement of computers in many faculty offices.
- Replacement of computers in the chemistry laboratories.
- Upgrade of the wireless capabilities in the chemistry laboratories.
- Replacement of microscopes in the Microbiology and Anatomy/Physiology laboratories.
- Replacement of computers for AutoCAD and GIS with high-end workstations supported on a local area network (LAN).
- Replacement of outdated computers in ME 100 and SSV 236 with thin clients able to function with recently purchased pcblabes.
- Upgrade of computer software: AutoCAD, SolidWorks, Maple, GIS Software Mathematica, Spectrum and MatLab.
- Nerve and muscle stimulators in the General Human Physiology laboratory.
- Purchase of a new cadaver for General Human Anatomy laboratory
- Expansion and enhancement of equipment needed to support pod casting and online instruction.

Facilities

A new Health and Science Building is anticipated for occupancy by the Spring Semester 2012 and planning for this eventuality is ongoing. The Science Faculty and Technicians have taken an active roll in the preparation of the plans for this exciting much needed building. This building as planned will provide sufficient room for growth in the lab sciences. At present, we are in need of wet lab space in support of Anatomy (BIOL 201) and Physiology (BIOL 202). Moreover, it is anticipated that demand for General Biology (BIOL 101) and Introductory Chemistry (CHEM 101) will soon exhaust existing lab times and will demand new space to be found. It is possible we will be able to utilize lab space in local high schools, such as Pete Knight High School, although the logistics of technical and equipment support at these remote sites will need to be worked out.

With construction of a new Performing Arts Theatre pending, the area occupied by Modular Buildings including T902, T903 and T905, rooms used by this Division, will be engaged in construction and removed from that site. At present, 25 sections of mathematics courses are taught in these locations and will have to be relocated on the Lancaster campus or relocated to the Palmdale site. The planned opening of the SOAR High School site may provide access to a wet laboratory and mathematics classrooms.

At present our ability to support faculty and technicians with office space is a pressing issue. Full-time faculty occupies office space in the Business Education, Applied Arts, OF1, OF2, Technical Education, T500 and T300. The Computer Technician is now housed in less than desirable space adjacent to the cadaver room and the Anatomy Laboratory. The smells from this area make it very difficult to work with any comfort. A new space for him must be identified away from the odors of the lab. To assist adjunct faculty with office hours and instructional preparations, the workroom in OF1 is available for their use. However, this space which houses our Clerical Assistant and copying equipment is for general usage and privacy essential for some office hours is not always available. This room is a valuable asset for the division but is not big enough.

Over the past few semesters the Division has offered online courses in several mathematics courses, general biology, geology, geography, and physical science. These courses have proven to be very popular and it is very apparent that with the introduction of more online math and science courses some of the above scheduling pressures could be remediated through this educational/instructional alternative. Currently, offerings of College Algebra and Statistics are being considered and a Physical Science instructor is researching the development of an online science laboratory and its instructional effectiveness. General Human Physiology, BIOL 202,202L have been approved for online delivery and will be taught for the first time during the 2008 Summer Session. It is anticipated, if the summer offering is successful, that this method for delivery of this course will accommodate some of the student demand for this course and may free up existing lab space for additional sections of Anatomy.

In addition to its use in lecture rooms and halls, computer technology has proven to be a very important learning tool in our Physics, Physical Science, Chemistry, and Physiology laboratories, AutoCAD, GIS and the open mathematics classroom, The Prime Room (ME100). The need for a stable network and equipment is paramount to the integrity of instruction and must be maintained. It was anticipated that a new Mathematics, Science and Engineering computer technician would contribute greatly to current operations and those into the future. However, this has not been the case and the tech has been relegated to the status of a Help Desk advisor. ITS has failed to allow the technician to work to his job description and therefore has failed to realize the benefits they would receive by having a qualified Computer Technician in the divisional classrooms and laboratories. This tech would be familiar with all the general and specific need the faculty has to meet their instructional goals. The faculty and staff of the division hope this situation can be resolved because it is simply a win-win situation for the students and the college.

With respect to the immediate future, the anatomy, physiology and chemistry faculty members are digitally recording lectures for pod casting via iTunes University and developing protocols for this alternative methods of delivery of lecture materials. There is a pressing need for a stable dependable system to be in place and for the College to fully embrace this method of instruction as an alternative to traditional instruction. It is clearly apparent from student comments that they have come to rely upon this mythology for information acquisition and instruction.

External Factors

Community

Currently there is no comparable local competition impacting the programs in Math, Science and Engineering; however, regionally we do compete with Cerro Coso, Victor Valley and College of the Canyons community colleges. We know that students turned away from our prerequisite nursing courses (Anatomy, Physiology and Microbiology) do consider these campuses as alternatives. As well, because of limited offerings in calculus and physics by Cerro Coso Community College at Edwards AFB, we attract students from southern Kern County to the AVC offerings.

The Mathematics, Science and Engineering Division draws its students from local and regional high schools and Air Force personnel at Edwards AFB. We work closely with the ROP through its support of Project Lead the Way, a national pre-engineering program offered in three local high schools: Lancaster, Highland and Pete Knight. Students from this program are attracted to AVC's engineering program that works closely with the College of Engineering, CSU Fresno at the University Center in Lancaster. The Health Care Academy, housed at the ROP in Palmdale, also yields students interested in careers in the medical field and with needs for additional study in Anatomy, Physiology and Microbiology (BIOL 204).

The local certificate in Geographic Information Systems has attracted students from across the greater Antelope Valley. In most instances, rather than traditional entry level high school students, it has attracted adults in need of skill enhancement to meet job requirements and

advancements. At present, the Geography faculty is working with the Regional Occupational Programs of the Antelope Valley Joint Union High School District to establish a pathway for high school students into this exciting career field and to the AVC courses of student. It is anticipated that enrollments in this program will increase as a function of the revision of this program into a Chancellor's Office approved Certificate of Achievement.

The faculty have participated in the establishment of articulation agreements with local high school programs including, but not limited to, the pre-engineering curriculum, engineering technology and environmental science.

Grants/Partnerships Participation

The visibility and outreach potential of the Division and the college has been greatly enhanced through the assistance of our community partners including: Edwards AFB, NASA Dryden Flight Research Center, Lockheed Martin Aeronautics, The Boeing Company, Northrop Grumman Corp., Edward's Community Alliance, MSET Consortium, AERO Institute, Regional Occupational Programs, and the Tech Week Committee. As well specific activities have brought attention to our programs and faculty. These include:

- Opening Pathways to College Degrees for Hispanic Students: A Comprehensive and Collaborative Approach, US Dept. of Education Title V Grant, AVC, CSU Bakersfield-AV & CSU Fresno-AV. 5year cooperative grant 2006-2011.
- Implementing a highly successful instruction model to reduce attrition rate in critical mathematics courses, Minority Science Engineering Instructional Improvement Grant, US Dept. Of Education, 3 years 2006-2009.
- California Space Authority US Dept. of Labor Workforce Innovation in Regional Economic Development (WIRED): California Innovation Corridor, AVC. 2006-2008.
- Creating Pathways for Prospective Science and Mathematics Teachers, NSF ATE Project 0402690, AVC. 3 years 2004-2007.
- Antelope Valley College and the Division works closely with the Northrop Grumman Corp. and the California Institute of Technology to provide their engineers and managers with a technical program in Systems Engineering.
- The Division of Mathematics, Science and Engineering is working jointly with California State University, Bakersfield and the Palmdale School District to provide enrichment of mathematics and science competency in school teachers.
- The Boeing Company and the Division are working jointly to provide local school districts with equipment that can be used in mathematics and science instruction.
- The Division is working jointly with the College of Engineering, California State University, Fresno to provide a complete undergraduate instructional program in electrical and mechanical engineering in Lancaster. This program has been embraced by the City of Lancaster at the University Center.
- The Air Force Research Laboratory, Edwards AFB through an Educational Partnership Agreement (EPA) has made very generous contributions of materials and equipment to the Physics, Astronomy, Chemistry and Engineering Materials laboratories.
- Math Field Day and the Bohn-Meyer Math Science Odyssey have provided middle school and high school students, respectively, with outstanding opportunities to explore

mathematics and science. Together with Engineering Day, these events could not take place if it were not for support by essentially the entire local aerospace industry.

- Discipline faculty have participated in the annual Salute to Youth day organized by the Career Prep Council of the ROP.

Legislative Factors

The certificate program in Engineering Technology and the local certificate program in GIS are supported through CTE-VTEA funding, while Drafting has been supported through federal Carl Perkins funding.

Additional

District funding to the Division has been better than it has been in the past. However, it is clear from the need to replace old equipment and the anticipated growth within programs that additional funding for consumable supplies and equipment will be required. This is reflected in the increased costs charged by vendors and the fact the Biological Sciences have exceed their budget allocation for 2007-08 instructional supplies by the end of the Fall Semester 2007. Proposition 20 funds have enabled the program to continue through the Spring Semester 2008.

Short Term Trends & Goals (3-5 years)

Short Term (3-5 years)

Table 24. Trends in enrollment for ten instructional programs in Mathematics, Science and Engineering as indicated by their relative contributions (%) to total FTES for Fall and Spring semesters from Fall 2003-Fall 2006.

Inst. Prog.	Semester													
	F03		S04		F04		S05		F05		S06		F06	
	FTES	%	FTES	%	FTES	%	FTES	%	FTES	%	FTES	%	FTES	%
ASTR	18.44	1.9	29.11	3.0	21.97	2.2	35.75	3.5	43	4.1	38.24	3.9	38.86	3.5
BIOL	271.9	27.8	271.7	28.2	279.7	27.6	276.9	27.3	280.4	26.6	264.2	26.7	321.6	29.2
CHEM	97.65	10.0	91.61	9.5	99.32	9.8	103.4	10.2	94.33	8.9	94.07	9.5	94.6	8.6
DRFT	3.52	0.4	3.73	0.4	5.91	0.6	4.35	0.4	6.42	0.6	6.32	0.6	7.46	0.7
ENGR	25.47	2.6	21.66	2.2	31.7	3.1	24.65	2.4	22.15	2.1	26.14	2.6	20.78	1.9
GEOG	51.5	5.3	60.41	6.3	63.83	6.3	66.31	6.5	58.44	5.5	51.4	5.2	47.21	4.3
GEOL	20.31	2.1	16.89	1.8	19.06	1.9	15.23	1.5	24.24	2.3	18.55	1.9	26.22	2.4
MATH	432.6	44.2	413.9	42.9	435.7	42.9	430.7	42.5	471.1	44.7	437.6	44.3	494.2	44.9
PHYS	25.97	2.7	24.7	2.6	27.02	2.7	26.34	2.6	30.11	2.9	26.54	2.7	23.46	2.1
PSCI	30.46	3.1	31.09	3.2	30.98	3.1	29.64	2.9	24.24	2.3	25.9	2.6	26.94	2.4
	977.8	100.0	964.8	100.0	1015	100.0	1013	100.0	1054	100.0	988.9	100.0	1101	100.0

Table 25. Trends in enrollment over seven semesters in the Division of Mathematics, Science and Engineering.

Institutional Program	Semester AVG %	Semester Range %	Fall 06 %	TRENDS
ASTR	3.2	1.9 - 4.1	3.5	slightly upward
BIOL	27.6	26.6 - 29.2	29.2	upward
CHEM	9.5	8.6 - 10.0	8.6	down
DRFT	0.5	0.4 - 0.7	0.7	upward
ENGR	2.4	1.9 - 3.1	1.9	down
GEOG	5.6	4.3 - 6.5	4.3	down
GEOL	2	1.5 - 2.4	2.4	upward
MATH	43.8	42.5 - 44.9	44.9	upward
PHYS	2.6	2.1 - 2.9	2.1	down
PSCI	2.8	2.3 - 3.2	2.4	down
FTES	1016.4	964.82 - 1101.4	1101.4	upward

As evident in the above tables (Table 24 and 25), the total amount of FTES generated by the Division of Mathematics, Science and Engineering has increased from 977.8 to 1101.0 FTES over the past seven fall and spring semesters. It is also evident that during this time period the ten principle instructional programs have experienced some interesting enrollment trends. This analysis, a comparison of the Fall 06 enrollments as a percentage of total FTES with the average percentage for seven semesters, is shown in the Trends in enrollment table, above. Distinct upward trends in FTES are indicated for the Biology, Drafting, Geology and the Math courses. There is a slight upward trend in Astronomy enrollment as an examination of the enrollment trends over the past two semesters reveals a sizeable increase in FTES, 264.2 to 321.6 FTES. Clearly, over the next 3-5 years there will be a continued increase in demand for the mathematics and biological courses. With respect to math, it is anticipated the need for basic skills math courses will continue to increase as a function of the deficiencies of math preparation in high schools students. Continued growth in the biological sciences reflects the high interest for courses prerequisite to the Programs in Health Sciences and students are somewhat familiar with biology and the perception that biology does not require significant math skill and hence is easier. Although this has not been substantiated, it is apparent that students are refraining from taking many of the science courses, other than chemistry needed for the Health Science programs, because they do not have the mathematics skills needed for success. Anecdotally, faculty who teach these science classes lament the lack of math preparation in these students. The divisional faculty is concerned about this and our college's inability to retain high numbers of students classified as true freshman and not continuing as sophomores.

As the AVC student population continues to grow, it is readily apparent it will become increasingly more difficult to schedule greater numbers of math and biology sections. This concern is a reflection of compensatory growth in the other divisions and the competition for limited space on the Lancaster campus. This situation clearly indicates the needed to expand the offerings at the Palmdale campus and to explore the use of space (lecture and laboratory) in the community's high schools. Laboratory space will be an issue and the ability to support offerings

at remote sites will be problematic considering the supplies and materials that are need and will have to be transported to operate a laboratory for 24 students.

Faculty is also concerned with the ability to conveniently schedule course sections and to provide students easy access to required courses. In particular math, physics and engineering courses have proven to be problematic. The problems exist in the scheduling of course sequences and overlaps in times of offering. These challenges must be addressed.

It is anticipated that a new Environmental Sciences Program will be developed in conjunction with the AVUHSD, ROP and Eastside High School. This program will include the drinking and waste water management programs and offer, amongst others, instruction in environmental chemistry, environmental geology, and alternative energy.

It is anticipated that the AVC Engineering program will continue to grow and work with CSU Fresno, College of Engineering Program at the University Center in Lancaster. The Title V grant will contribute to the enhancement of the student pipeline of prospective engineering students from local high schools to AVC. It is also anticipated that the Project Lead the Way pre-engineering courses will be introduced to the college and made available to all area high school students.

It is anticipated that the Engineering Technology program will be revised and provide for the introduction of GIS/GPS technology in the application of AutoCAD to engineering applications. This will involve the reintroduction of surveying to the curriculum.

The Division will continue to support the Pathways Program for Teacher Preparation including future teachers and in service teachers needing additional course work in mathematics and science. Once again, Title V will provide support and it is anticipated that additional grant funding will be acquired.

The Division would like to explore the possibility of offering course work and certificate development in two areas: Nanotechnology and Biotechnology and Bioinformatics. At present, the Lockheed Martin Aeronautics Company and the AERO Institute in Palmdale are engaged in the development of a Nanotechnology Program and discussions concerning AVC's participation have begun. The Mathematics, Science and Engineering Division has recently been included in a NSF Grant proposal submitted for by the AERO Institute and involving the introduction of nanotechnology to high school students. As with Nanotechnology, the National Science Foundation, Advanced Technical Education Program has established national centers providing guidance for the establishment of these programs of study at community colleges and AVC will utilize these resources in the establishment of the programs. As an example, Fall 2008 the University of California Santa Barbara will conduct an NSF sponsored workshop addressing undergraduate education in nanotechnology and AVC will attend.

Personnel

1. It is anticipated that a significant number of long term full-time faculty will be retiring over the next 3-5 years. These positions will have to be replaced and it is further anticipated that additional new positions will be needed to support the mathematics program. As well, with

the development of new programs in biotechnology, nanotechnology, bioinformatics and environmental science, new faculty will need to be hired.

2. As stated previously, the Division is in significant need of a laboratory technician to work afternoons and evenings in support of our late afternoon and evening instructional laboratories. The instructors of these sections are presently on their own should a technical need arise. With expansion of programs at both the Lancaster and Palmdale sites this will require an additional need bringing our technical personnel needs to 2 technicians over the next 3-5 years.
3. In order to be able to meet the management /administrative needs of a large college, the division is in great need of a Department Chair structure. This will provide for a much more efficient means of communication and hence general operation including management and instructional issues.

Long Term Vision (10 Years)

1. Establish a comprehensive Environmental Sciences Program at the new Palmdale campus. Certificate and transfer education will be provided.
2. Expand our science programs into the new Health and Science Building, providing training in Nanotechnology and Biotechnology and Bioinformatics. It is anticipated this program will support local public and private aerospace industries plus provide training for employment in advanced future medical technology and diagnostics.
3. Support outstanding student preparation in mathematics and science leading to careers in education.
4. AVC is a partner on the Workforce Innovation Regional Economic Development (WIRED) grant received by the California Space Authority from the U.S. Department of Labor. One aspect of this three year grant intended to support the California Innovation Corridor is the preparation of a skilled workforce including academics, engineers, scientists and technicians. With an emphasis on education in mathematics, science engineering and technology (MSET or STEM), the goal is to assure that local, regional, and national public and private aerospace industrial firms and businesses are competitive in regional, national and global markets. This competitiveness that will impact the status of the nation's standard of living will be achieved through innovation and entrepreneurial capabilities and transformability. Clearly the need for STEM education will be necessary and AVC and the Division should place short-term and long-term emphasis on math, science, engineering and career technical education programs. This is very important considering the graying of the national workforce, the flattening of global economics and the need for the nation to maintain and nurture its innovative edge.
5. AV SOAR High School, as apart of the national Early College High School initiative is contributing to the development of a new educational paradigm that will enhance student success in high school and completion of programs of study in higher education or career technical fields. This will result in an infusion of highly qualified students into graduate

education and/or the job market. The results of these infusions will be a significant stimulation of the US economy and a competitive edge in global markets.

Palmdale

Involvement at the Palmdale Campus

The Division of Mathematics, Science and Engineering is integral to the course offerings of a comprehensive community college and as such is integral to the Palmdale campus. A total of 20 sections were taught at 15th street east during the Fall06-Spring07 Semesters. For the first time sections of Geography 101 and 101L were taught during Spring07 and it is anticipated that additional science courses, not in need of a wet laboratory, will be taught.

Development at the Palmdale Campus - Short-Term (3-5 years)

Continue to expand the math and science course offerings making it possible for Palmdale students to complete their degrees or transfer requirements. This will require the presence of wet laboratories and may require these sections being taught at area high schools. We are currently exploring the possible use of the labs at Pete Knight High School. However, the provision of instructional equipment and supplies may be problematic.

With continued enrollment pressure and projected student population growth plus the loss of instructional space associated with new construction, it is anticipated that a significant number of sections of mathematics currently taught on the Lancaster campus will have to be moved to the Palmdale site.

Many of the online courses taught in mathematics and science are hybrid courses requiring visits to the campus several times during the period of instruction. Because of space limitations on the Lancaster campus it is conceivable that the Palmdale campus could become a hub for online instruction and provide space for the visitations.

Vision at Palmdale Campus - Long Term (10 Years)

The mathematics and science core curriculum will be taught at this site. In addition, an Environmental Sciences Program will be developed and anchored at that site. It is also conceivable that with the establishment of a Nanotechnology Program with Lockheed Martin and the AERO Institute, in Palmdale, that our program would be on this campus.

Elements Necessary for Self-Sufficiency at the Palmdale Campus

Lectures and laboratory space in support of all the sciences: chemistry, geology, physics, biology, biotechnology, nanotechnology, etc. and mathematics. To achieve this, there will be the need for permanent faculty and an administrative staff to operate the facilities.