Executive Summary

Physical Sciences Division Program Review 2011/2012

The Physical Sciences Division at Monterey Peninsula College serves several critical functions. One of our primary duties is to give students the lower-division foundation in Math, Chemistry, Earth Sciences, Physics/Astronomy and Engineering they need to succeed when they transfer to a four-year institution. We've had many students come back to visit who have told us that the education they received in our division enabled them to truly excel after they transferred; they felt they got a better education and were more prepared for their upper-division studies than their fellow students who started at the four-year college or university as freshmen.

Another important function of our Division is to give basic skills support to students who enter as freshmen lacking the academic background they need to succeed. Our math classes start at the Arithmetic level and progress upward to transfer level classes. At the developmental level we offer a variety of instructional methods and modalities designed to foster success in the classroom. One important fact to acknowledge is that basic skills requirements don't stop at Math and English but are also necessary to succeed in the sciences. To facilitate these skills we have the Math Learning Center, which encourages students from all disciplines using math in their curriculum to come in for drop-in help. We have direct line-of-sight supervision from full and adjunct instructors, as well as student tutors and one Instructional Specialist (soon to be two), and all are available to provide one-on-one or group support. Because of budget cuts however, we are only able to give support to students below the Calculus level.

A third function of our Division is to provide life-long learning to the members of our community. While not such a large component as is found in other divisions, we get students who take our classes just for the joy of it. We've had 80-year old women in our math classes 'just to keep their brains sharp', as well as retirees who have always wanted to know about the Geology of the Central Coast and now have the time to do it. These life-long learners are valued members of our learning communities, bringing a leavening of wisdom and experience to the classroom culture.

Strengths common to our Division

1. **Our outstanding Faculty and Staff,** who are serving the college and its students with dedication, creativity and the vision necessary to do their jobs and instruct their students in the midst of ever-increasing financial challenges.

2. **Vitality of our academic programs and our relationships with the community at large**

- The Earth Sciences Department remains committed to giving students the opportunity to experience geology and oceanography in the field; field trips remain an integral aspect of the curriculum. In recent semesters, efforts have been made to support the field experiences in the classroom using Google Earth. A Sarlo Grant was obtained to buy equipment and provide travel expenses to create high-resolution, zoomable panorama photographs of MPC field trip sites and notable field sites throughout the state. These enable instructors to review field-trip stop observations at a variety of scales. In oceanography, efforts have been underway for several years to create animations of oceanographic parameters such as sea surface temperature, atmospheric pressure, winds, and currents using Google Earth.
- The Physics/Astronomy department is working collaboratively with Enrico Ramirez at UCSC, the director of the TASC (Theoretical Astrophysics in Santa Cruz) Institute. This program selects promising Astronomy students from several local Community colleges and gives them the opportunity to work with a world-class Astronomy program and faculty during their summer institute.
- The Chemistry department works closely with Biology and the ACCESS program. ACCESS is a community college outreach program that encourages students to pursue research careers, and is a partnership between UCSC and Cabrillo, Gavilan, Hartnell and MPC. They have also offered short courses of interest to students in $4^{th} - 6^{th}$ grades through the Lyceum of the Monterey Peninsula.
- The Engineering department, in coordination with MATE, is a member of the Carmel High Robotics Advisory Board. Carmel High has a state-of-the-art robotics facility and has been holding collaborative competitions between various high-schools. Because of the success of these programs, they have been encouraging us to explore offering a career/tech robotics program. The department has also been acting as a liaison to an Engineering Council that provides tablet computers to Engineering Faculty. This will allow them to upload their lectures so students can participate remotely.
- The Math department has been collaborating with other community colleges in the state on a project involving Smart Pens and their use in the classroom. Several full-time and adjunct instructors have received the pens and data is being collected to see how they influence success and retention in the classroom.

Challenges common to our Division

1. **Staffing needs.**

- Math department There is an extremely critical need in the Math department for additional staffing. Since 1990 the department has remained at a staffing level of 10 full-time instructional faculty. They added the position of MLC Coordinator in 2008. From Fall 2005 to Fall 2011 they have increased their course offerings from 38 sections to 56 sections, all without increasing the number of their full time teaching faculty. To meet the needs of their students and the college, they have been relying on their increasingly large pool of adjunct faculty. The critical need for additional full-time faculty has been well documented in the Math Department's Action Plans, their Program Reviews and Program reflections. Unexpectedly at the end of last semester Bob Donovan retired, and our MLC Coordinator resigned to be closer to his family. Ed Migliore could be retiring at the end of this Academic year. To

provide for the needs of our students and to continue generating the large quantities of FTES that the department produces each semester, it is vital to the program that these three positions be replaced. Note that this will merely bring the department up to 1990 instructional staffing levels that are quite insufficient to cope with the numbers of students trying to add math courses in 2012. As some of the Math department's adjuncts retire, and others accept full-time jobs elsewhere or take adjunct positions at other colleges that pay substantially more, the program will be increasingly unable to meet the enrollment demands of students needing math classes. For this reason, at least two net new positions would be needed to meet the burgeoning demand. However, the Math department recognizes the severity of the current financial situation and hopes that these positions will be considered for approval when the economy recovers.

- Physics/Astronomy department The Physics/Astronomy department used to consist of 3 full-time instructors. Due to the resignation of David Michaels in Spring 2011, the department has been reduced to two full-time instructors. They have been able to maintain the program to some degree by the use of adjuncts and no longer offering an online-version of Astronomy, but for the program to grow and thrive it will soon need to be restored to its full complement of instructors.

2. **Technology in our classrooms and offices.** We have an increasing reliance on technology in the classroom. Document cameras, projectors and computers are incorporated into our lectures, presentations and demonstrations. As these machines break and/or wear out from use, budget issues are preventing them from being replaced. The same can be said for computers in our offices. There is a very strong need for reliable, fast machines, but the tech-refresh budget is non-existent.

3. **Establishing a MESA Center on the MPC campus.** MESA (Mathematics, Engineering, Science Achievement) is a nationally recognized program that engages academically disadvantages students so they excel in math and science. MESA centers provide workshops, academic advising and counseling, a student study center, assistance in the transfer process, career advising and professional development. Unfortunately establishing a center requires the college to provide a dedicated space and funding for a director. It's important to note that Cabrillo, Gavilan and Hartnell all have MESA centers on their campuses, and provide these services to their students.

Ongoing Plans for Action

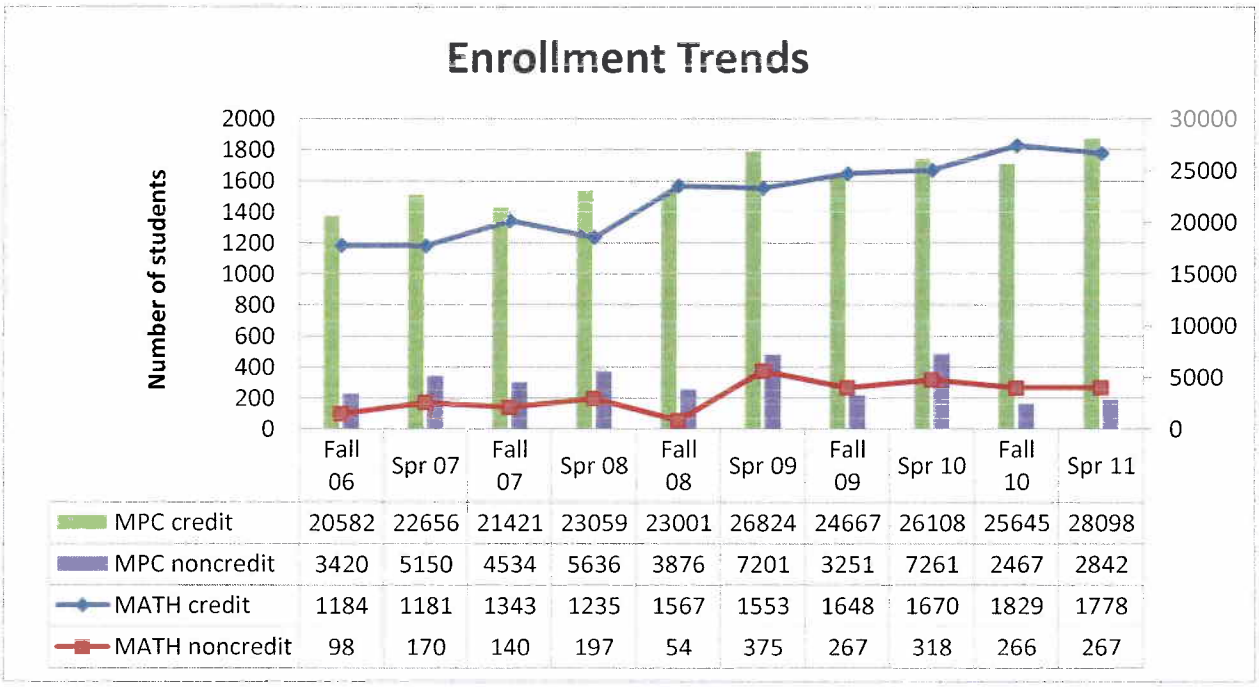
1. We will continue to advocate for the replacement of our recent retirements/resignation and the restoration of our vacant position. We also will continue to request the addition of at least two net new instructional Math faculty as the financial situation improves.

2. Our building is currently being remodeled and we are housed and are teaching in a wide variety of locations on campus. We look forward to moving into our redesigned and updated classrooms and labs.

3. The Physical Sciences Division will continue to provide outstanding instruction to our students, despite the financial uncertainty in our future.

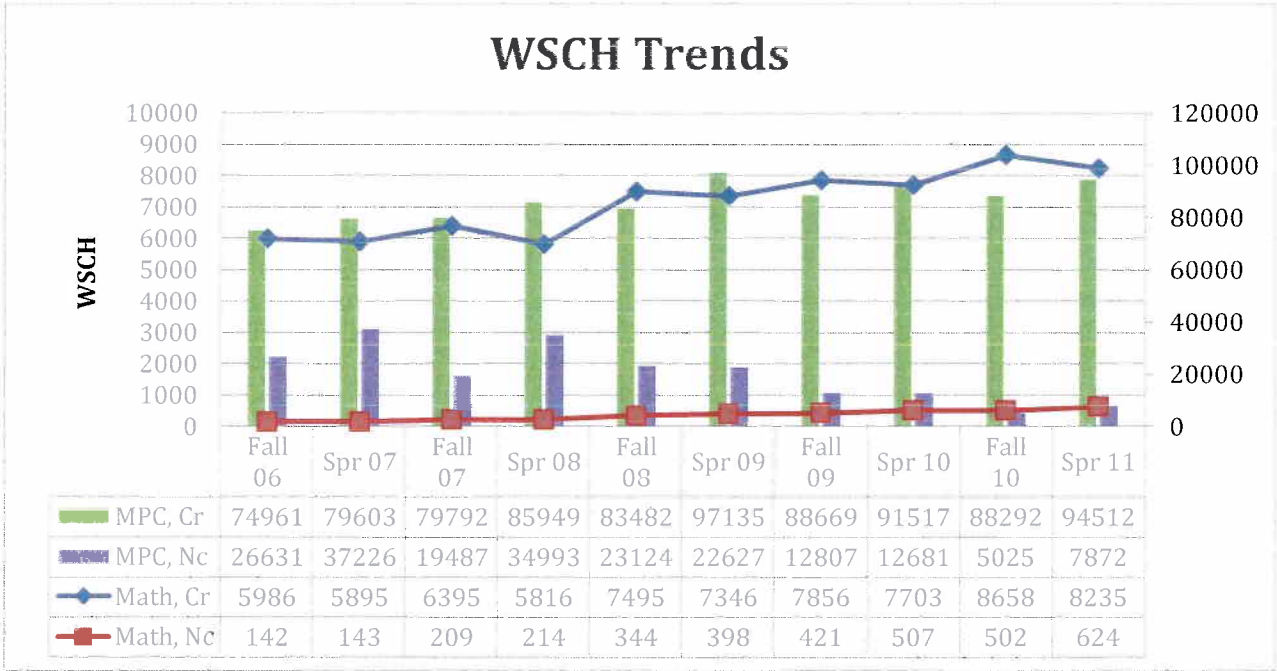
Department Synopsis – Math

a) Below are the 5 year enrollment trends for the Math program and for the college



	Fall 06	Spr 07	Fall 07	Spr 08	Fall 08	Spr 09	Fall 09	Spr 10	Fall 10	Spr 11
MPC credit	20582	22656	21421	23059	23001	26824	24667	26108	25645	28098
MPC noncredit	3420	5150	4534	5636	3876	7201	3251	7261	2467	2842
MATH credit	1184	1181	1343	1235	1567	1553	1648	1670	1829	1778
MATH noncredit	98	170	140	197	54	375	267	318	266	267

b) Below are the WSCH (Weekly Student Contact Hours) for the college and the Math program over the past 5 years



	Fall 06	Spr 07	Fall 07	Spr 08	Fall 08	Spr 09	Fall 09	Spr 10	Fall 10	Spr 11
MPC, Cr	74961	79603	79792	85949	83482	97135	88669	91517	88292	94512
MPC, Nc	26631	37226	19487	34993	23124	22627	12807	12681	5025	7872
Math, Cr	5986	5895	6395	5816	7495	7346	7856	7703	8658	8235
Math, Nc	142	143	209	214	344	398	421	507	502	624

Comments:	Math enrollments stayed relatively flat at around 1200 students per semester for many years up until 2008. Since then, our enrollments have steadily increased. This is probably due to three factors: the new Math 263 graduation requirement;

	our implementation of the Math Placement Test; and the economic down-turn. Increased enrollments have put a stress on the department to provide additional sections for students. We have not been able to find and retain an adequate number of qualified adjunct instructors. A number of sections have been cancelled due to lack of qualified adjunct instructors. If we'd had more full-time faculty, our enrollments in recent semesters would have been substantially higher. The increased enrollments have also brought more students into the Math Learning Center creating a need for a larger MLC adjunct budget as well as new classified staff positions. In addition, an Instructional Specialist is needed to work specifically with Basic Skill Students. Due to budget cuts, the MLC only works with students below calculus. To accommodate the transfer students, the addition of a MESA center would help relieve some of this need. The trend in WSCH follows the same trend in enrollments described above.

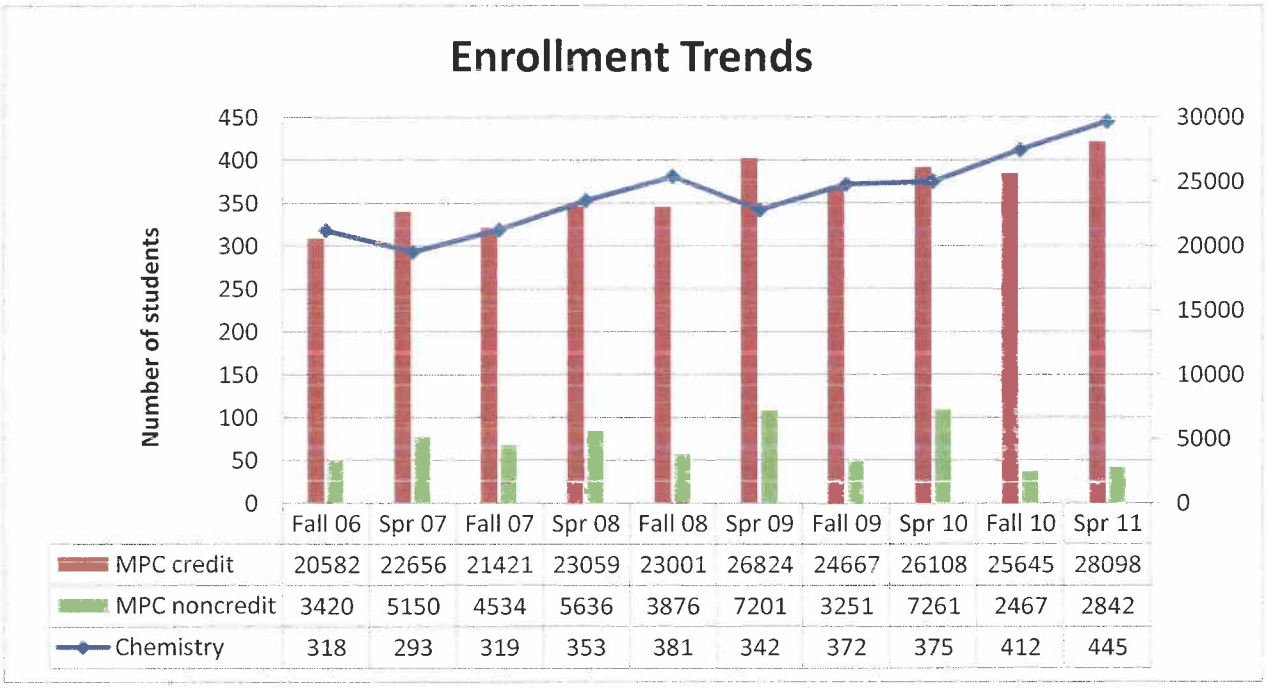
c) Below are the FTES and FTE for your program, as well as the college's and your program's ratios between FTES and FTE. Comment on any fluctuations that may have occurred.

Math	Fall 08	Spr 09	Fall 09	Spr 10	Fall 10	Spr 11
FTES – Credit	249.6	246.3	262.8	257.1	289.9	275.5
FTES – Noncredit	11.5	13.3	14.0	16.9	16.7	20.8
FTE – Full-time	9.15	9.03	8.82	9.37	9.76	9.31
FTE – Adjunct	6.42	7.29	7.29	7.29	7.62	7.68
FTE – MLC only	2.60	2.70	2.20	2.20	2.20	2.30
Program FTES/FTE	14.37	13.65	15.12	14.53	15.66	15.36

Comments:	The Credit FTES numbers have increased significantly in the last three years while the Full-time FTE numbers have remained about the same. This is a problem for our department. The Adjunct FTE numbers have steadily increased. This puts an additional burden on the math department to recruit, train, evaluate, and support our adjunct instructors.

Department Synopsis – Chemistry

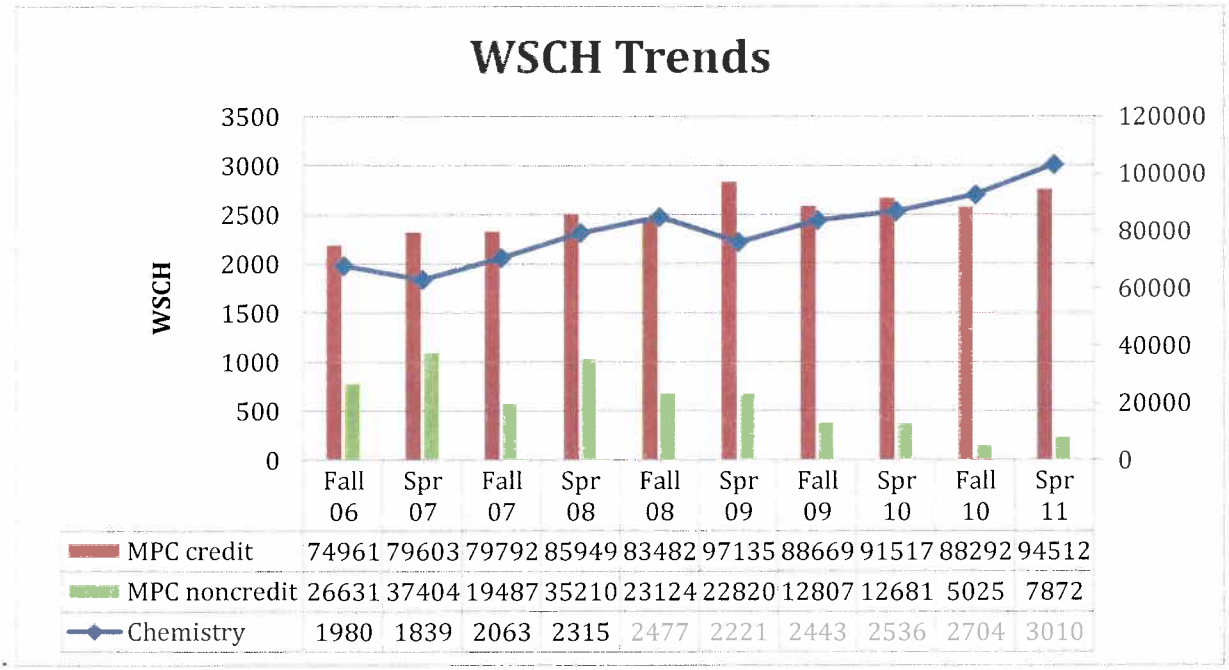
a. Below are 5 year enrollment trends for the Chemistry program and for the college.



	Fall 06	Spr 07	Fall 07	Spr 08	Fall 08	Spr 09	Fall 09	Spr 10	Fall 10	Spr 11
MPC credit	20582	22656	21421	23059	23001	26824	24667	26108	25645	28098
MPC noncredit	3420	5150	4534	5636	3876	7201	3251	7261	2467	2842
Chemistry	318	293	319	353	381	342	372	375	412	445

Comments:	For the past five years, the chemistry enrollment trend has paralleled the college's enrollment trend. However, there has been a steady increase in the enrollments starting in fall 2009 through spring 2011. Plausible reasons for the increase in enrollment are: the rapid technological advances require future workers to have a background in STEM and the higher university enrollment fees are resulting in more students attending MPC for their lower division chemistry courses.

b. Printed are the WSCH for the college and for the Chemistry program over the past 5 years



Comments:	The WSCH has increased due to increased student enrollment that may due to unemployed workers seeking retraining and/or students choosing to enroll in MPC rather than enrolling in the CSU or UC system.

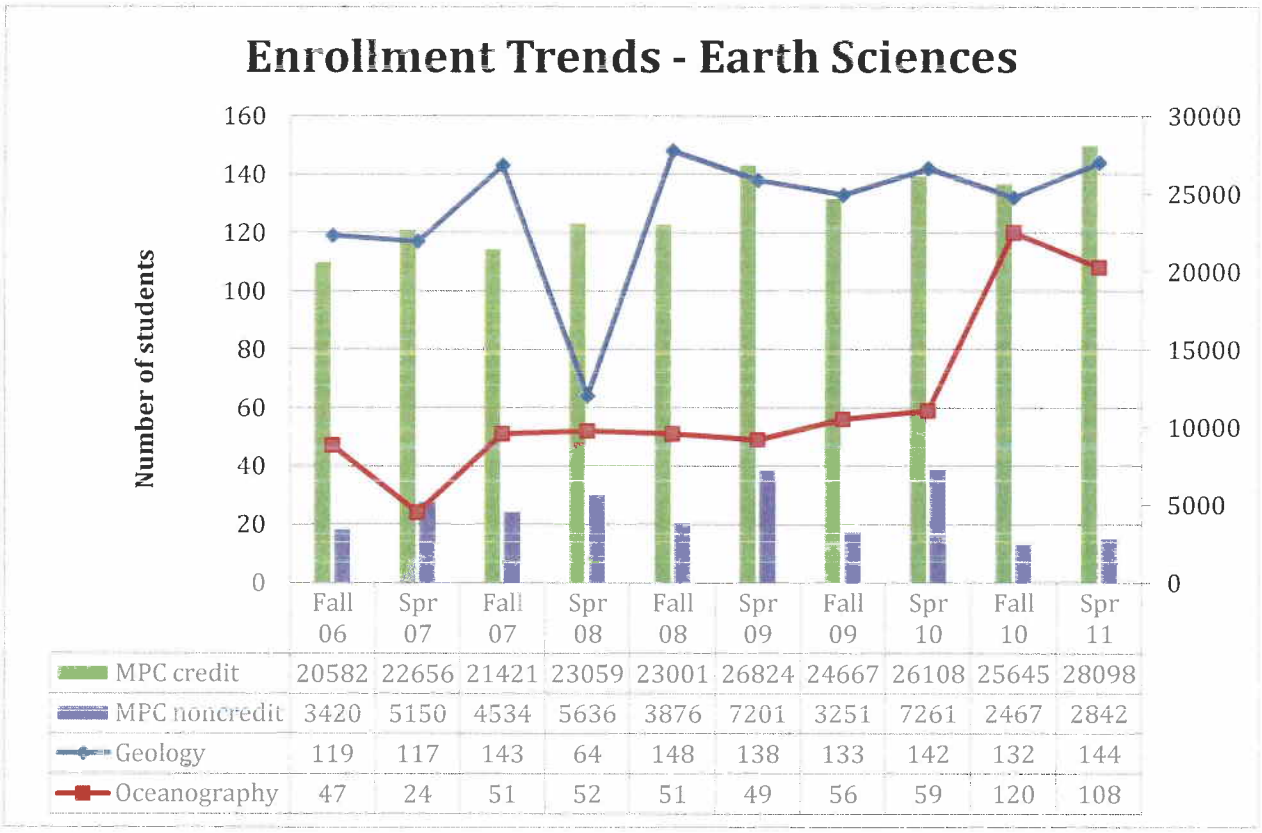
c) Below are the FTES and FTE for Chemistry, as well as the college's and the Chemistry program's ratios between FTES and FTE.

Chemistry	Fall 08	Spr 09	Fall 09	Spr 10	Fall 10	Spr 11
FTES – Credit	82.6	74.2	81.4	84.8	90.4	99.6
FTES – Noncredit	0	0	0	0	0	0
FTE – Full-time	3.98	4.41	3.58	4.43	4.28	3.81
FTE – Adjunct	0	.57	.80	.57	0	.57
Program FTES/FTE	20.75	14.90	18.58	16.96	21.12	22.74

Comments:	The department has been able to accommodate the increased number of students with three full-time instructors and two part time instructors.

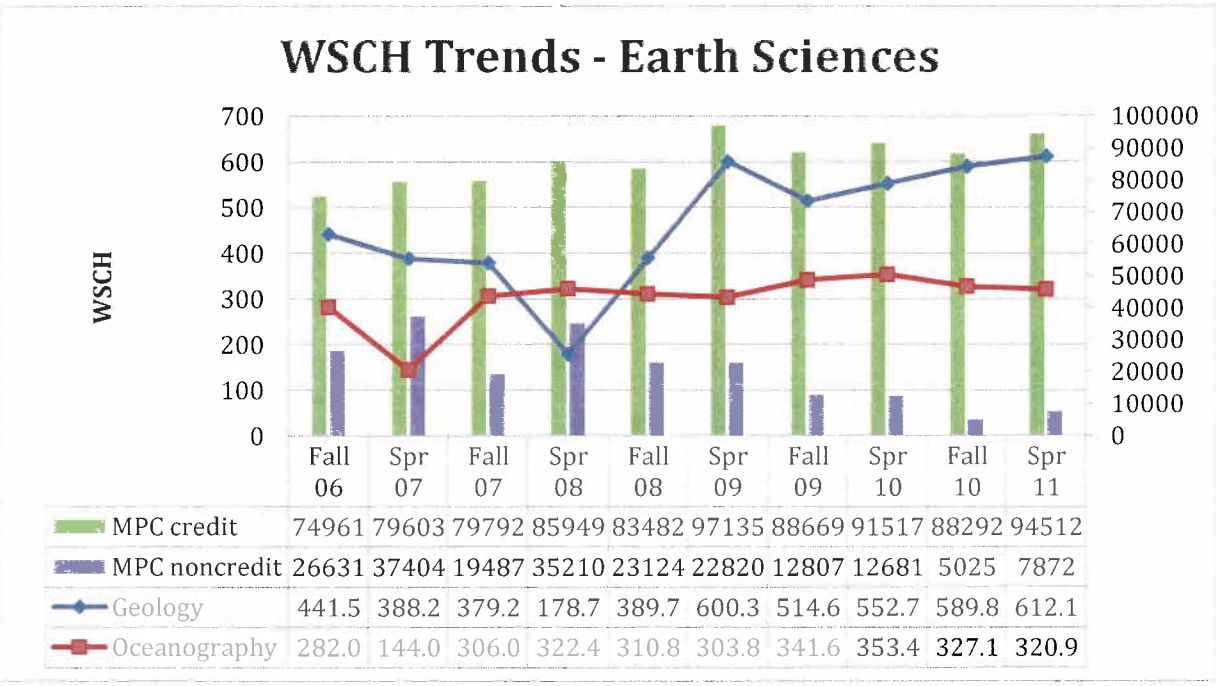
Department Synopsis – Earth Sciences

a) Below are 5 year enrollment trends for Earth Sciences and for the college.



Comments:	The two dips in Spring 2007 and Spring 2008 are due to cancelling of one section of Oceanography and Geology, respectively, because of low enrollments. The Increase in the number of students in Oceanography in Fall 2010 is due to splitting OCEN 2L away from OCEN 2. Starting with Fall 2010, Oceanography students were counted twice, once for OCEN 2 and once for OCEEN 2L. All Geology students are counted twice over the entire time frame shown by the chart. Over this entire time, we've had GEOL 2 and GEOL 2L. Aside from these apparent deviations, enrollment in Earth Sciences courses has been remarkably consistent over the last six years.

c. Printed are the WSCH for the college and Earth Sciences over the past 5 years



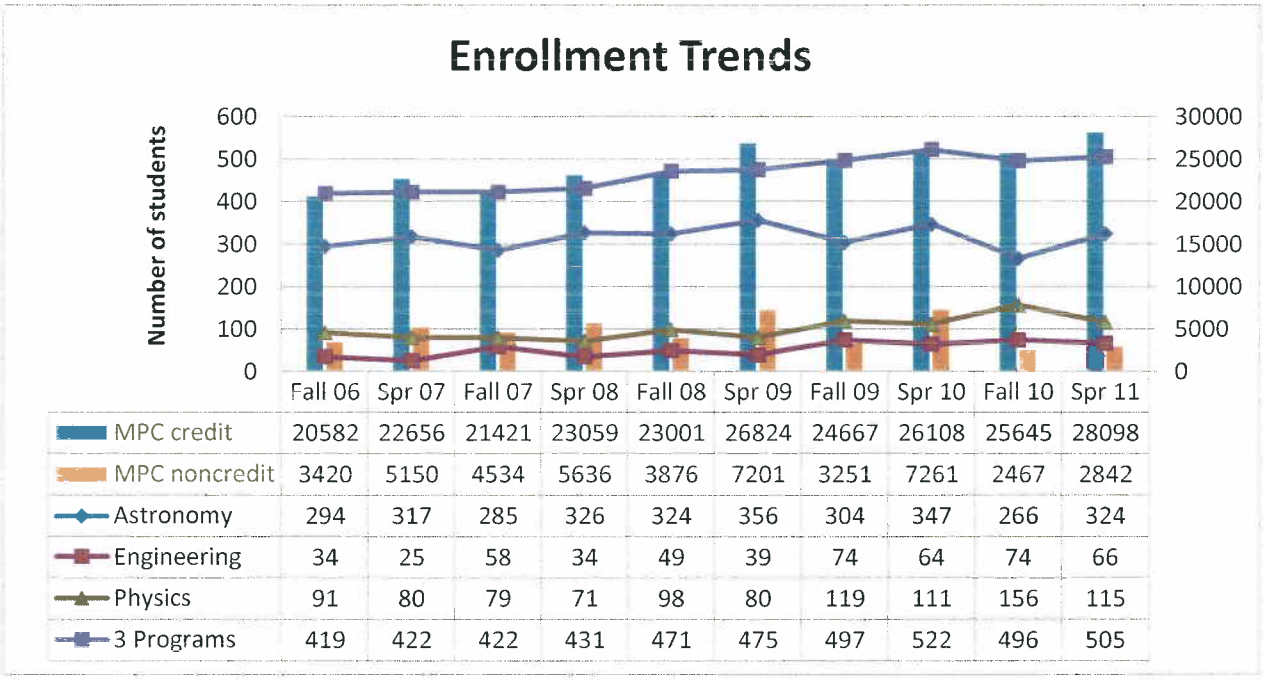
Comments:	Similar to the last chart, there is a dip in Spring 2007 and Spring 2008 due to cancelling classes due to low enrollments. Note that in this chart, there is no big increase in Fall 2010 for Oceanography. In Spring 2009 we started running 2 GEOL 2 classes and three GEOL 2L classes. Previously, up to Fall 2008, we had three GEOL 2 classes. Thus, we increased our efficiency in Spring 2009, which shows up on this WSCH chart, but not on the enrollment chart.

d. Printed are the FTES and FTE for the Earth Sciences program, as well as the college's and the program's ratios between FTES and FTE. Comment on any fluctuations that may have occurred.

	Fall 08	Spr 09	Fall 09	Spr 10	Fall 10	Spr 11
FTES – Credit	23.4	24.4	24.7	26.6	23.9	24.5
FTES – Noncredit	0	0	0	0	0	0
FTE – Full-time	.20	.20	.20	.20	.35	.35
FTE – Adjunct	1.05	1.05	1.05	1.05	1.20	1.20
Program FTES/FTE	18.72	19.52	19.76	21.28	15.42	15.81

Comments	The big change in Fall 2010 results from splitting the OCEN 2L away from the OCEN 2 course. I don't understand why this should make such a big difference. I spent the same time teaching in the classroom when the classes were combined as when they're split.

a) Below are 5 year enrollment trends for the program and for the college.



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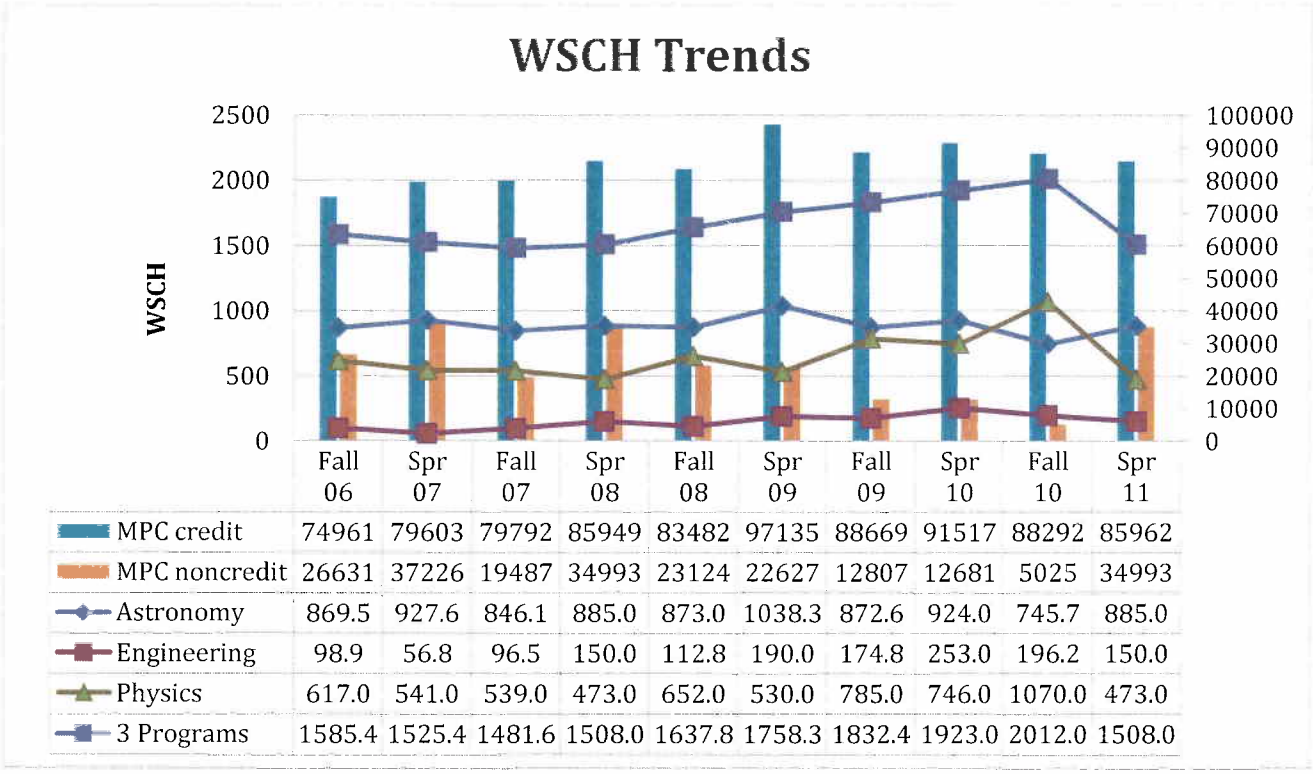
MPC noncredit	3420	5150	4534	5636	3876	7201	3251	7261	2467	2842
Astronomy	294	317	285	326	324	356	304	347	266	324
Engineering	34	25	58	34	49	39	74	64	74	66
Physics	91	80	79	71	98	80	119	111	156	115
3 Programs	419	422	422	431	471	475	497	522	496	505

Comments:	Overall, our enrollments have been on the increase. However with the deletion of the on-line version of ASTRO 10 in the 2011-2012 year, there will probably be a significant drop in astronomy enrollment.

b) Printed are the WSCH for the college and the program over the past 5 years



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MPC noncredit	26631	37226	19487	34993	23124	22627	12807	12681	5025	34993
Astronomy	869.5	927.6	846.1	885.0	873.0	1038.3	872.6	924.0	745.7	885.0
Engineering	98.9	56.8	96.5	150.0	112.8	190.0	174.8	253.0	196.2	150.0
Physics	617.0	541.0	539.0	473.0	652.0	530.0	785.0	746.0	1070.0	473.0
3 Programs	1585.4	1525.4	1481.6	1508.0	1637.8	1758.3	1832.4	1923.0	2012.0	1508.0

Comments:	The fluctuations are normal for small programs.

c) Printed are the FTES and FTE for your program, as well as the college's and your program's ratios between FTES and FTE.

	Fall 08	Spr 09	Fall 09	Spr 10	Fall 10	Spr 11
FTES – Credit	55.0	59.0	62.1	66.8	66.8	64.9
FTES – Noncredit	0	0	0	0	0	0
FTE – Full-time	3.62	3.84	3.62	3.71	3.58	3.71
FTE – Adjunct	0	0	0	0.28	0	0.28
Program FTES/FTE	15.19	15.36	17.15	16.74	18.66	16.27