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Academic Program Review

Name of discipline: Mathematics

Division chairperson: L. J. McKenzie

Phone Number: 310-233-4501

Degree Program: Associate of Science

Certificate program: N/A

Skills certificate: N/A

Self-Study Committee for Harbor
Division Chairperson: L. J. McKenzie

Program Review Chairperson: L. J. McKenzie

<table>
<thead>
<tr>
<th>Program Tenured Faculty</th>
<th>Program Adjunct Faculty</th>
<th>Program Adjunct Faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td>M. Gagrat</td>
<td>N. Andres-Sandor</td>
<td>J. Macias</td>
</tr>
<tr>
<td>M. Jimenez</td>
<td>R. Broas</td>
<td>A. Martinez</td>
</tr>
<tr>
<td>F. Ma</td>
<td>M. Can</td>
<td>J. Muncherian</td>
</tr>
<tr>
<td>J. Pavlina</td>
<td>J. Desulima</td>
<td>Z. Ni</td>
</tr>
<tr>
<td>Z. Romero</td>
<td>B. Dovner</td>
<td>N. Noguera</td>
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<tr>
<td>F. Saddigh</td>
<td>A. Elshihabi</td>
<td>T. Oepomo</td>
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<td></td>
<td>F. Faridpak</td>
<td>B. Ohm</td>
</tr>
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<td>A. Gill</td>
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<td>K. Heneks</td>
<td>R. Salem</td>
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<td></td>
<td>T. Hoang</td>
<td>M. Saso</td>
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<td></td>
<td>S. Huang</td>
<td>R. Sibner</td>
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<tr>
<td></td>
<td>G. Judd</td>
<td>D. Strivewell</td>
</tr>
<tr>
<td></td>
<td>D. Le</td>
<td>B. Tong</td>
</tr>
<tr>
<td></td>
<td>L. Le</td>
<td>R. Wong</td>
</tr>
</tbody>
</table>

Program Staff: N. Muro – Mathematics Instructional Assistant
A. Vega – Division Secretary

Academic Dean: D. Humphreys

Academic Cluster Vice-President: L. Rosas

Outside professional or alumni: S. Fasteau

Students currently enrolled in the program under review:
Program Mission

The mission of the department is to provide students with a foundation of mathematical skills and competencies needed to satisfy a variety of degree and careers goals. Recognizing the diverse background of students, this foundation includes basic skills, transfer level and specialized courses that aim to contribute to workforce development and improvement. In all aspects of its mission, the department’s goal is to provide a supportive learning environment that imparts student success in analyzing, quantifying and developing critical thinking skills. The curriculum focuses on recognizing the interdependence between theory and application, enhancing it with the appropriate use of classroom technology.

Program Description and Overview

The Mathematics Department offers courses that meet AA degree, occupational and transfer programs requisites such as allied health, engineering, pre-med and physical sciences. Courses offered in this department vary from developmental/remedial to college sophomore level. The department supports special students' populations by closely working with college support services such as Counseling, Financial Aid and Special Services programs.

Mathematics is an integral part of many college programs that include at least one requisite course in this subject. Mathematics competency is required for the AA/AS degrees awarded at the college. In addition, many college programs include at least one requisite course in math to meet certificate and/or degree requirements.

The Mathematics Department meets the academic goals and strategies of the College by offering a flexible schedule of courses that accommodates morning, evening and Saturday student populations. Scheduling of courses is based on student demand and course rotations that allow students to complete their transfer requirements in a timely manner.

The Mathematics Department is located in the newly built Northeast Academic Hall, occupying room NEA 222, 224, 225, 226, 227, 229, 231, as well a suite of faculty offices. In addition the Mathematics laboratory is located in the campus Learning Assistance Center room 105B.

Program Learning Outcomes and Assessment Results

Student will demonstrate increasing levels of mastery of the following outcomes throughout the mathematics curriculum. Upon successful completion of the requirements for the Associate of Arts Degree, students will

- Create, interpret and analyze graphs and charts that communicate quantitative or relational information
- Apply mathematical techniques to solve problems that arise in the real world
- Determine and carry out an appropriate mathematical algorithm to solve problems with or without the support of technology
- Communicate content information formally, using appropriate mathematical notation and terminology
- Engage in logical and critical thinking

A. Program Curriculum – Appendix A

B. Mathematics Course Flow Chart - page 12
C. Student Learning Outcomes

Upon successful completion of mathematics courses, students will have a foundation in mathematics skills and competencies needed to satisfy a variety of degree and careers goals.

Upon successful completion of Math 105/112 with a grade of “C” or better, students will be able to satisfy the minimum pre-requisite for Math 123A.

Upon successful completion of Math 123A and B with a grade of “C” or better, students will be able to meet the mathematics competency requirement for the AA degree, if the student matriculated prior to fall 2009.

Upon successful completion of Math 123C with a grade of “C” or better, students will be able to meet the mathematics competency level for the AA degree, if the student matriculated in or after fall 2009.

Upon successful completion of Math 123C with a grade of “C” or better, students will be able to satisfy the minimum pre-requisite for math and science transfer courses.

Upon successful completion (with a grade of “C” or better) of Math courses at least one level above Math 123C, students will be able to meet minimum mathematics transfer requirements.

D. Assessment Results

Math Department faculty have always been involved in the assessment of their students, however new ACCJC accreditation standards presently demands that student learning outcomes be assessed on an ongoing and systematic basis.

The department conducted its first formal assessment project in spring 2008 by defining and refining student learning outcomes and formulating a rubric to measure success. Course outlines of record for all courses went through extensive revision to ensure alignment of measurable learning outcomes.

The findings and recommendations derived from this project have produced important data for the department to analyze success as well as failure.


3. During 2010 – 11 Math Department developed program learning outcomes and will link and assess these to the college institutional learning outcomes.

Supporting Documentation – appendix B

E. Program Modifications
Course Realignment
Pursuing the philosophy that the study of mathematics is an integral part of the student’s preparation in all aspects of academic development, during the fall of 2000 the department collapsed the course offerings of Math 113, 114, 115, 125, 125A and 125B, with academic units varying from 2.5 to 5, into a cohesive three course Math 123A, B and C sequence with equal academic units. The purpose of this modification was two fold: firstly to bring about order to a rather erratic course sequence with multiple paths and secondly to increase the retention rate in the entry level algebra sequence. Fall 2000 to 2004 data shows a modest increase in the retention rate for students undertaking the elementary and intermediate algebra sequence.

Math Jam
A program was introduced in the summer of 2008 to provide incoming students with the necessary math and college skills to be successful in their freshman experience in elementary algebra and other college courses. The program was modeled after Pasadena City College’s namesake.
The program was set up as a cohort/learning community involving Math 112 – Pre Algebra, PD 017 – College Survival Skills and CAOT 185 – Directed Study.

Online Delivery
Several mathematics classes polled during Sp 2007 led to the scheduling of the first hybrid mathematics course. A single section of Math 123C was scheduled to be offered during the spring 2010 term to assess student success with this type of instructional delivery. The department is planning to follow up with a hybrid section of Math 227 during the fall 2010 term.

Based on the assessment of student learning outcomes at the course and program levels areas that require modifications to improve performance and areas that are working well and should be expanded.

1. Areas for improvement:
Based on placement scores data, the Mathematics Department faculty realize that they cannot continue to increase the number of basic skills sections offered to meet demand without increasing the number of full-time faculty hired to teach these sections. Faculty in this department will also continue to review the way that basic skills courses are staffed. Faculty require continued training on how to conduct basic skills classes effectively since the number of students placing into this level increases yearly. A smaller student to teacher ratio in basic skills courses would be beneficial to student interaction; consequently the recommendation is to lower the class limit in basic skills sections to 35 students. Use computer instructional software provided by text book publishers to increase student practice time and exposure.

Train department faculty in the use of web-based support services such developing websites.

Supporting Documentation – High School Placement Data - page 40

2. Areas for reinforcement:
Following is a list of—short-term and long-term time goals:

a. Continue discussion on basic skills program
   i. coordinate workshops and reading groups for basic skills “best practices”
   ii. use of faculty resources (e.g. Developmental Education Committee members, faculty with BSI training)  
   iii. reinstate supplemental instruction
b. Increase focus on professional development
   i. designate time at each department meeting
   ii. observe each other’s classrooms

c. Increase and improve participation from discipline members
   i. vary dates and times of department meetings; set calendar for semester
   ii. form course review committees

d. Continue focus on assessment and commitment to implement findings and recommendations
   i. build in time between projects for faculty to implement findings and recommendations
   ii. tie this to professional development with course review/project committee members
      presenting findings and describing some practical classroom strategies for improvement

e. Improve communication with part-time faculty
   i. more workshops, orientations
   ii. improve current department website
   iii. create a mentoring program

f. Improve communication with feeder high school and transfer institution mathematics faculty
   i. organize workshops, orientations
College Data for the Math-Physical Sciences and Technology Division

(Source: 2008 LAHC Factbook)

A. External SCAN--General

1. Demographics—Service Area will grow at a slower rate than State average.

2. Demographics—Aging Population in the College’s Service Area
   i. The number of High School Seniors in our Service Area will peak in 2010 and then decline
   ii. The number of 15-19 year olds will decline over the next 10 years

3. Demographics—Percentage of Latinos and Asians in service area will increase, while percentage of Whites and African-Americans will decrease over the next 10 years.

4. Economic Downturn--For LAHC, Rising Unemployment is associated with Rising Enrollment.

5. Technology—Incoming students will be much more comfortable in the “virtual world” than previous generations.

B. External SCAN—Occupations in Math, Physical Science and Technology Division.

Recognizing the diverse background of students, the division offers programs that support the workforce development mission of the college:

Demographics for engineering general and related fields indicate a steady 10% increase in job demand through the year 2017.
Source: EMSI Complete Employment - Spring 2008 Release v. 2

Executive Summary
Although the number of positions available in the areas of astronomy, chemistry, computer science, mathematics and physics is not overwhelming, demographics indicate a steady 16% to 19% increase in job demand through the year 2017. As part of the program review, Math Departments will address present and future trends in mathematics, science and technology education as described professional articles such as Strengthening the Science and Math Pipeline, an AASCU policy paper found at http://www.aascu.org/policy_matters/pdf/v2n11.pdf, and Science and Mathematics, found at http://www.ohiostem.org/_data/user_docs/SAMEPAC_REPORT_FINAL_1-22.pdf

C. Internal SCAN—Performance

1. The average class retention in mathematics courses through census week, from 2003 to 2007, was 74.4%, on a par with the California state average of 75%

2. The average mathematics course completion rate from 2003 to 2007, was 48.4% lower than the California state average of 53%

3. The average class size in mathematics courses from 2003 to 2007, was 41 exceeding both division and college average of 34.6 for the same time period.
4. Recent personnel changes in the department include retirements of S. Downey, K. Keller and C. Huff in 2002, 2007 and 2009 respectively. The accompanying table summarizes the numerical relationship between adjunct and tenured faculty as budget and FTES targets fluctuate.

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<thead>
<tr>
<th>Year</th>
<th>Equipment $</th>
<th>Hourly</th>
<th>Full-time</th>
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<tr>
<td>2006</td>
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<td>9.0</td>
<td>1.0</td>
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<td>2007</td>
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<td>8.0</td>
<td>1.0</td>
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<td>2008</td>
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<td>2009</td>
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5. The accompanying tables summarizes enrollment and efficiency data for the discipline

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<tr>
<th>Year</th>
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<th>2005</th>
<th>2006</th>
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<td>WSCH COLLEGE</td>
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6. FTES (FALL ONLY)

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<th>2005</th>
<th>2006</th>
<th>2007</th>
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<tr>
<td>FTES/FETF COLLEGE</td>
<td>20</td>
<td>19</td>
<td>22</td>
<td>20</td>
<td>26</td>
</tr>
</tbody>
</table>
7. Degrees awarded: according to the Factbook one (1) degree was awarded in 2004-05.

Executive Summary
Factbook data supports the position that the Mathematics Department efficiency is below the college norm in the areas of class retention and course completion, but exceeds the college class size average by a considerable margin.
The Mathematics Department mirrors the college attrition trend with no retirement replacements due to a serious fiscal deficit.
The department meets student demand for math courses by scheduling day, afternoon, evening and weekend classes. The department enrollment is strong and parallels district, state and nationwide student enrollment patterns.

Areas of the program that need strengthening

Instructional Assistance: additional instructional staffing is required in the math lab to provide better service to students enrolled during evening hours and weekends.

Student Placement: to ensure greater success in the math sequence of courses offered, the department must undertake a cyclical review of the placement instrument and cut off scores used to enroll students in math courses. After extensive review and discussion, the math department faculty attempted to replace the present COMPASS placement instrument. Major local and state hurdles have to be addressed in order to achieve this goal.

D. Program Strengths

Curriculum: Courses have been designed to fully prepare students to meet math competency requirements for the AA degree, math requirements for courses offered at the college, and CSU/UC transfer requirements.

Instructional Assistance: the department operates an instructional math lab to supplement math instruction for students enrolled at the college. The math lab operates Monday through Saturday employing one instructional assistant and several peer tutors.

E. Program and unit plan modifications necessary for program improvement.

Department faculty visited the Campus Placement Center to get a first hand look at the math placement process. Recommendations to improve the placement of students into Math courses have been forwarded to the Matriculation Committee.

Department faculty continues to review textbooks and search for technology that will help students succeed in meeting their math requisites.

F. Sources of data outside the college data set used for the program review
AMATYC, MAA and NCTM articles discussing trends and challenges in the teaching of mathematics.
California Community College System Office enrollment data.

G. Trends are indicated by the data
1. The average class retention in mathematics courses through census week, from 2003 to 2007, was 74.4%, on a par with the California state average of 75%
2. The average mathematics course completion rate from 2003 to 2007, was 48.4% lower than the California state average of 53%.

3. The average class size in mathematics courses from 2003 to 2007, was 41 exceeding both division and college average of 34.6 for the same time period.

Describe any unique institutional goals the program satisfies:

The Mathematics Department aligns with the institutional missions and strategic LACCD goals by offering an array of classes and resources to meet the needs of all college students such as:

1. Developmental, remedial, transfer-level courses, emphasizing mathematical skills and critical-thinking
2. Sophomore-level courses provide transfer requirements that parallel four year colleges and university curricula.
3. Pre-college, tutorial, and supplemental instruction for under-prepared students through course offerings, the Open Entry/Exit Mathematics Laboratory, and peer tutoring.
4. Classes are provided at a great range of times, on weekends, and through hybrid formats.
5. The department strives to improve student retention and success by providing an effective learning environment for students, focusing on teaching excellence.
6. The department is actively engaged in implementing and assessing, SLOs for each of its courses, to ensure that its offerings are both effective and responsive to student needs, and ultimately ensuring improved student success and retention rates.
7. The department is actively engaged in mapping course SLO’s, PLO’s and ILO’s for the upcoming ACCJC accreditation report and visit.

- **Degree Information:**

Presently the number of declared mathematics major is unknown.

The program review did not focus on the gender breakdown of students. Math Department faculty do not consider this to be relevant issue at this time.

The program review did not focus on the ethnic breakdown of students. Math Department faculty do not consider this to be relevant issue at this time.
MATHEMATICS FOR COMPUTER SCIENCE - Major Code: 1701.01
Plan A
A.S. Degree Program Requirements
UNIT REQUIREMENTS: A minimum of 60 semester units of course credit in a selected curriculum which includes at least 30 semester units of general education coursework as specified in the College Catalog (GENERAL EDUCATION REQUIREMENTS- GRADUATION PLAN A) and at least 18 semester units of study taken in a single discipline or related disciplines as indicated below (MAJOR REQUIREMENT). See course description for prerequisites since these will be strictly enforced. When planning their program of study, students should see a counselor.
MAJOR REQUIREMENTS
Completion of each of the following courses with a grade of "C" or better:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 102 General Chemistry II</td>
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</tr>
<tr>
<td>PHYS 38 Elect. Magnet. Optics</td>
<td>5</td>
</tr>
<tr>
<td>MATH 165, 170, 175</td>
<td></td>
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<tr>
<td>Computer Programming</td>
<td>3</td>
</tr>
<tr>
<td>MATH 270 Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>or</td>
<td></td>
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<tr>
<td>MATH 275 Diff. Equations</td>
<td>3</td>
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<tr>
<td>ENGLISH 101 College Reading and Composition I</td>
<td>3</td>
</tr>
</tbody>
</table>

Below is a departmentally recommended sample program which groups required major courses into four semesters. Students must also complete 30 units of General Education requirements from Graduation Plan A.

Degree and Certificate Programs * 69 2004-2006 General Catalog

Sample Program
FIRST SEMESTER Units
+CHEM 101 General Chemistry I 5
+ENGL 101 Reading and Composition I 3
+MATH 265 Calculus I 5
MATH 155 Introduction to Visual Basic 3
SECOND SEMESTER
CHEM 102 General Chemistry II 5
MATH 266 Calculus II 5
PHYS 37 Mechanics Solids, Sound 5
THIRD SEMESTER
MATH 267 Calculus III 5
MATH 270 Linear Algebra 3
MATH 165, 170, 175 3
Computer Programming 3

Mathematics 2008-09 13
PHYS 38 Elect. Magnet. Optics 5
FOURTH SEMESTER
MATH 275 Diff. Equations 3
MATH 165, 170, 175
Computer Programming 3
Additional G.E. Requirements 21

**Total Units for this A.S. Degree** 74

+ This course may count towards General Education Requirements
MATHEMATICS COURSE SEQUENCE FLOW CHART

INSERT PAGE 151 OF THE 2008-10 COLLEGE CATALOG
COURSES OFFERED

MATH 100 - MATHEMATICS WORKSHOP (1) RPT 3
NDA
Co-requisite: Concurrent enrollment in a mathematics or mathematics related course.
Laboratory 3 hours and 20 minutes per week.
This course supplements all mathematics level courses by providing tutorial and self-help assistance. Offered on a credit/no credit basis only.

MATH 105 - ARITHMETIC FOR COLLEGE STUDENTS (3)
NDA
This course explores arithmetic concepts from a modern point of view. It includes discussion of pre-algebra topics, applications of arithmetic in business and finance, and geometry.

MATH 112 - PRE-ALGEBRA (3) NDA
This course presents a review of arithmetic topics and an introduction to elementary algebraic topics including signed numbers, exponents, mathematical sentences, and linear equations.

MATH 121 - ESSENTIALS OF PLANE GEOMETRY (3)
Prerequisite: completion of Math 123A & B or equivalent with a grade of “C” or better
This course covers the definitions, axioms and theorems of geometry relating to angles, lines, circles, polygons and polyhedra. The meaning and techniques of logical proof are emphasized.

MATH 123A - ELEMENTARY AND INTERMEDIATE ALGEBRA I (4)
Prerequisite: completion of Math 112 with a grade of “C” or better, or placement by exam.
First of three modules for Math 123 covering elementary algebra topics such as properties and operations with real numbers, addition, subtraction, multiplication of algebraic expressions, solution of linear equations and inequalities. Solution of word problems involving linear equations and inequalities. Also includes graphing linear functions.

MATH 123B - ELEMENTARY AND INTERMEDIATE ALGEBRA II (4)
Prerequisite: completion of Math 123A with a grade of “C” or better
Second of three modules for Math 123 covering elementary algebra topics such as addition, subtraction, multiplication of polynomials, (done in 123A not 123B) solution of second degree equations and radical expressions, solution of word problems involving second degree equations, and radical expressions.

MATH 123C - ELEMENTARY AND INTERMEDIATE ALGEBRA III (4)
Prerequisite: completion of Math 123B with a grade of “C” or better
Third of three modules for Math 123 covering intermediate algebra topics such as functions and their operations, conic sections, series and sequences. Applications of these topics to business, science and engineering are included.

MATH 215 - PRINCIPLES OF MATHEMATICS I (3) UC: CSU
Prerequisite: completion of Math 123C with a grade of “C” or better
First of two courses in a sequence designed for elementary school teachers. Emphasis is on the study of sets and relations, numeration systems, basic problem solving, elementary number theory and their applications.

MATH 216 - PRINCIPLES OF MATHEMATICS II (3) UC: CSU
Prerequisite: completion of Math 215 with a grade of “C” or better
Second of two courses in a sequence designed for elementary school teachers. Emphasis is on the study of probability, statistics networks, basic geometry concepts and their applications.

MAT 227 - STATISTICS (4) UC: CSU
Prerequisite: completion of Math 123C with a grade of “C” or better
This course is an introduction to probability, descriptive and inferential statistics including measures of central tendency and dispersion, sampling and estimation. Hypothesis testing, analysis of variance, tests of independence, linear correlation and regression analysis are also covered.

MATH 230 - MATHEMATICS FOR LIBERAL ARTS STUDENTS (3) UC: CSU
Prerequisite: A grade of “C” or better in Mathematics 123C
This course surveys selected topics in modern algebra including voting methods, apportionment, mathematics of finance, number theory, probability, statistics and graph theory. (CAN MATH 2)

MATH 234 – COLLEGE LEVEL ALGEBRA (4) UC: CSU
Prerequisite: completion of Math 123C with a grade of “C” or better
This course is designed to prepare students to apply mathematical concepts and quantitative reasoning at a collegiate level. Topics include solution of higher order equations and inequalities, functional analysis, zeroes of polynomials, exponential and logarithmic functions, solution of systems of equations using matrices, and binomial expansions.

MATH 235 - FINITE MATHEMATICS (5) UC: CSU
Prerequisite: completion of Math 123C with a grade of “C” or better
The objective of this course is to expose students to various mathematical techniques required in solving business and social science related problems. The topics cover a brief survey of basic algebra, together with the theory of matrices, simplex method, and their applications in linear programming. In addition, the course also covers mathematics of finance, probability theory with applications to statistics, the binomial and normal distributions.

MATH 240 - TRIGONOMETRY (3) CSU
Prerequisites: completion of Math 121 and 123C with a grade of “C”
This course provides a study of the circular functions and equations, as well as formulas related to angles and the solution of triangles and their applications to other sciences. (CAN MATH 8)

MATH 260 - PRE-CALCULUS (5) UC: CSU
Prerequisite: completion of Math 123C with a grade of “C” or better.
Topics in college algebra such as induction, the binomial theorem, theory of equations, arithmetic and geometric series, determinants and matrices. Function analysis and analytic geometry topics also covered. (CAN MATH 16)
Prerequisites: completion of Math 240 and 260 with a grade of “C” or better. Business majors are urged to take Mathematics 235 and 236 instead of Mathematics 260 and 265 unless they plan to take additional calculus courses. Some business majors may need to take engineering calculus—consult a counselor. This is the first in a sequence of three courses in calculus and analytic geometry. Topics include functions, limits, continuity, derivatives, integrals of rational and trigonometric functions. Applications include topics in engineering and physics.

MATH 266 - CALCULUS WITH ANALYTIC GEOMETRY II (5) UC: CSU
Prerequisite: completion of Math 265 with a grade of “C” or better.
This course includes applications of integrals to work and pressure, exponential, logarithmic, inverse trigonometric and hyperbolic functions. Additional topics include integration techniques, improper integrals, L’Hôpital’s Rule, infinite series and analytic geometry of conic sections.

MATH 267 - CALCULUS WITH ANALYTIC GEOMETRY III (5) UC: CSU
Prerequisite: completion of Math 266 with a grade of “C” or better.
This course includes polar spherical and cylindrical coordinates; parametric equations, vector algebra and calculus in two and three dimensions; partial derivatives; multiple integrals and applications.

MATH 270 - LINEAR ALGEBRA (3) UC: CSU
Prerequisite: completion of Math 266 with a grade of “C” or better. Recommended co-requisite: Concurrent enrollment in Math 267.
Matrix algebra, vector spaces, linear transformations and matrices are included in this course. There is emphasis on theory and applications.

275 - ORDINARY DIFFERENTIAL EQUATIONS (3) UC: CSU
Prerequisite: completion of Math 267 with a grade of “C” or better or concurrent enrollment in Mathematics 267.
This is a course in differential equations with emphasis on applications in physical science. Traditional methods of solution by closed forms are studied together with series solutions and numerical methods of solution. La Place transforms are also included.

MATH 185 - DIRECTED STUDY-MATH (1) UC*:CSU RPT 2
Prerequisite: Completion of Math 123C with a grade of “C” or better.
Conference 1 hour and 5 minutes per week per unit.
Allows student to pursue directed study in Math on a contract basis under the direction of a supervising instructor.
* UC credit may be granted by petition after transfer.

MATH 285 - DIRECTED STUDY-MATH (2) UC*:CSU
Prerequisite: Completion of Math 123C with a grade of “C” or better.
Conference 1 hour and 5 minutes per week per unit.
Allows student to pursue directed study in Math on a contract basis under the direction of a supervising instructor.
* UC credit may be granted by petition after transfer.

MATH 385 - DIRECTED STUDY-MATH (3) UC*:CSU
Prerequisite: Completion of Math 123C with a grade of “C” or better
Conference 1 hour and 5 minutes per week per unit.
Allows student to pursue directed study in Math on a contract basis under the direction of a supervising instructor.
* UC credit may be granted by petition after transfer.

Credit limit: A maximum of 3 units in Directed Study is allowed for any combination of Math 185, 285 and 385.

COOPERATIVE WORK EXPERIENCE EDUCATION
Mathematics is approved for Cooperative Work Experience Education credit. See Cooperative Education courses for prerequisites, course descriptions, and credit limits.

Mathematics 2008-09 18
Section I: Basic Course Information

Outline Status:

1. College: Harbor
2. Subject (Discipline) Name: Mathematics
3. Course Number: 275
4. Course Title: Ordinary Differential Equations
5. Units: 3
6. Catalog Course Description -- Provide a description of the course, including an overview of the topics covered:

This course introduces the theory and applications of ordinary differential equations with emphasis on applications in the physical sciences. Traditional methods of solution by closed forms are studied together with series solutions, numerical methods and Laplace transforms solutions.

7. Class Schedule Course Description -- Provide a brief description of the course, including an overview of the topics covered:

This course introduces the theory and applications of ordinary differential equations with emphasis on applications in the physical sciences. Traditional methods of solution by closed forms are studied together with series solutions, numerical methods and Laplace transforms solutions.

8. Initial College Approval Date:

Underlined course attributes are the same for the course throughout the LACCD; all other course attributes are college specific.
9. UPDATES (check all applicable boxes):

- Content Last Update: 09/04/09
- Objectives Last Update: 09/04/09
- College Specific Course Attributes/Data Elements Last Update:
- Districtwide Course Attributes/Data Elements Last Update:
- Other (describe) Last Update:

10. CLASS HOURS:

<table>
<thead>
<tr>
<th></th>
<th>&quot;Standard Hours&quot; per Week (based on 18 weeks)</th>
<th>Total Hours per Term (hrs per week x 18)</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture:</td>
<td>3.00</td>
<td>54.00</td>
<td>3.00</td>
</tr>
<tr>
<td>Lab/activity (w/homework):</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Lab/activity (w/o homework):</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Total:</td>
<td>3.00</td>
<td>54.00</td>
<td>3.00</td>
</tr>
</tbody>
</table>

Note: The Carnegie Rule and Title 5, section 55002 sets forth the following minimum standards: 1 unit = 1 hour lecture per week, 2 hours homework per week; OR 2 hours per week of lab with homework; OR 3 hours of lab per week without homework. The hours per week are based on a standard 18-week calendar. Lecture also includes discussion and/or demonstration hours, laboratory includes activity and/or studio hours.

11. PREREQUISITES, COREQUISITES, ADVISORIES ON RECOMMENDED PREPARATION, and LIMITATION ON ENROLLMENT

Note: The LACCD’s Policy on Prerequisites, Corequisites and Advisories requires that the curriculum committee take a separate action verifying that a course’s prerequisite, corequisite or advisory is an “appropriate and rational measure of a student’s readiness to enter the course or program” and that the prerequisite, corequisite or advisory meets the level of scrutiny delineated in the policy.

- Prerequisites: Yes  (If Yes, complete information below)

<table>
<thead>
<tr>
<th>Subject</th>
<th>Number</th>
<th>Course Title</th>
<th>Units</th>
<th>Validation Approval Date (official use only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>267</td>
<td>Calculus with analytic Geometry III</td>
<td>5.00</td>
<td></td>
</tr>
</tbody>
</table>
12. REPETITIONS -- Number of times course may be repeated for credit (three maximum): 0 (see: Section V, #9)

13. OTHER LIMITATIONS ON ENROLLMENT (see Title 5, Section 58106 and Board Rule 6803 for policy on allowable limitations. Other appropriate statutory or regulatory requirements may also apply):

N/A

Section II: COURSE CONTENT AND OBJECTIVES

1. COURSE CONTENT AND SCOPE – Lecture: Hours

<table>
<thead>
<tr>
<th>COURSE CONTENT AND SCOPE – Lecture</th>
<th>Hours</th>
<th>COURSE OBJECTIVES - Lecture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Types of differential equations: separable variables, exact and linear equations, substitution methods, linear, homogeneous and non-homogeneous equations reduction in order of a differential equation with constant coefficients. Applications</td>
<td>12</td>
<td>State and apply solution methods and theorems related to ordinary differential equations</td>
</tr>
<tr>
<td>Solution of differential equations with constant coefficients: undetermined coefficients, annihilator variation of parameters and Cauchy-Euler methods. Applications</td>
<td>9</td>
<td>State and apply solution methods and theorems related to ordinary differential equations</td>
</tr>
</tbody>
</table>

State and apply solution methods and theorems related to ordinary differential equations

State and apply solution methods and theorems related to ordinary differential equations

Formulate sophisticated methods of problem solving and critical thinking using differential equations
Systems of linear differential equations, nonlinear differential equations & 9 & Develop techniques for applying differential equations to the solution of problems arising in science and engineering

Modeling with differential equations: initial value problems, spring mass systems, boundary value problems & 9 & Develop techniques for applying differential equations to the solution of problems arising in science and engineering.

Solution of differential equations using power series & 6 & Attain further proficiency in methods of mathematical analysis.

Laplace Transforms. Numerical methods & 9 &

<table>
<thead>
<tr>
<th><strong>COURSE CONTENT AND SCOPE --</strong></th>
<th><strong>Hours per Topic</strong></th>
<th><strong>COURSE OBJECTIVES - Laboratory (If applicable):</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory: If applicable, outline the topics included in the laboratory portion of the course (outline reflects course description, all topics covered in class).</td>
<td></td>
<td>Upon successful completion of this course, the student will be able to… (Use action verbs – see Bloom’s Taxonomy below for “action verbs requiring cognitive outcomes.”)²</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Total Lecture hours</strong></th>
<th><strong>0.00</strong></th>
</tr>
</thead>
</table>

*Total lecture and laboratory hours (which include the final examination) must equal totals on page 1.

2. **REQUIRED TEXTS:**

Provide a representative list of textbooks and other required reading; include author, title and date of publication:


3. **SUPPLEMENTARY READINGS:**

Reading assignments may include, but are not limited to the following:

None

4. **WRITING ASSIGNMENTS:**

² In general “activity” courses or portions of courses are classified “laboratory.”
Title 5, section 55002 requires grades to be “based on demonstrated proficiency in subject matter and the ability to demonstrate that proficiency, at least in part, by means of essays or, in courses where the curriculum committee deems them to be appropriate, by problem solving exercises or skills demonstrations by students.” Writing assignments in this course may include, but are not limited to the following:

**Students will be required to maintain a journal of their experiences in the course including perceptions of significant topics, assignments and exam results.**

5. REPRESENTATIVE OUTSIDE ASSIGNMENTS:
   Out of class assignments may include, but are not limited to the following:

   **Navigate History Topics Index internet website to find historical information on the mathematician Leonhard Euler.**

6. REPRESENTATIVE ASSIGNMENTS THAT DEMONSTRATE CRITICAL THINKING:
   Title 5, section 55002(a) requires that a degree-applicable course have a level of rigor that includes “critical thinking and the understanding and application of concepts determined by the curriculum committee to be at college level”. Critical thinking may include, but is not limited to analysis, synthesis, and evaluation. Provide examples of assignments that demonstrate critical thinking.

   **Compare and contrast information found on the internet on the topic numerical approximations to Euler methods discussed in class.**

7. METHODS OF EVALUATION:
   Title 5, section 55002 requires grades to be “based on demonstrated proficiency in subject matter and the ability to demonstrate that proficiency, at least in part, by means of essays, or, in courses where the curriculum committee deems them to be appropriate, by problem solving exercises or skills demonstrations by students.” Methods of evaluation may include, but are not limited to the following (please note that evaluation should measure the outcomes detailed “Course Objectives” at the beginning of Section II):

   **Exams, quizzes and homework assignments are used to determine the course grade**

8. METHODS OF INSTRUCTION:
   Methods of instruction may include, but are not limited to the following:
   - Lecture
   - Discussion
   - Laboratory
   - Activity
   - Field Experience
9. SUPPLIES:

List the supplies the student must provide.

**Textbook, handheld scientific calculator and notebook.**

10. COMPUTER COMPETENCY:

If applicable, explain how computer competency is included in the course.

N/A

11. INFORMATION COMPETENCY:

Information competency is the ability to find, evaluate use, and communicate information in all its various formats. It combines aspects of library literacy, research methods and technological literacy. Information competency includes consideration of the ethical and legal implications and requires the application of both critical thinking and communications skills. If applicable, explain how information competency is included in the course.

**Students will be required to compare and contrast information found on the Internet with information provided in class.**

12. DIVERSITY:

If applicable, explain how diversity (e.g., cultural, gender, etc.) is included in the course.

N/A

13. SCANS COMPETENCIES *(required for all courses with vocational TOP Codes; recommended for all courses)*:

**RESOURCES**

- **Managing Time**: Selecting relevant goal-related activities, ranking them in order of importance, allocating time to activities, and understanding, preparing and following schedules.
Managing Money: Using or preparing budgets, including making cost and revenue forecasts; keeping detailed records to track budget performance, and making appropriate adjustments.

Managing Material and Facility Resources: Acquiring, storing, allocating, and distributing materials, supplies, parts, equipment, space or final products in order to make the best use of them.

INTERPERSONAL

Participating as Member of a Team: Working cooperatively with others and contributing to group’s efforts with ideas, suggestions and effort.

Teaching Others New Skills: Helping others learn needed knowledge and skills.

Exercising Leadership: Communicating thoughts, feelings, and ideas to justify a position, encouraging, persuading, convincing or otherwise motivating an individual or group, including responsibly challenging existing procedures, policies or authority.

Negotiating: Working toward agreement that may involve exchanging specific resources or resolving divergent interests.

Working with Cultural Diversity: Working well with men and women and with people from a variety of ethnic, social, or educational backgrounds.

INFORMATION

Acquiring and Evaluating Information: Identifying a need for data, obtaining the data from existing sources or creating them, and evaluating their relevance and accuracy.

Organizing and Maintaining Information: Organizing, processing and maintaining written or computerized records and other forms of information in a systematic fashion.

Interpreting and Communicating Information: Selecting and analyzing information and communicating the results of others, using oral, written, graphic, pictorial, or multimedia methods.

Using Computers to Process Information: Employing computers to acquire, organize, analyze and communicate information.

SYSTEMS
Understanding Systems: Knowing how social, organizational and technological systems work and operating effectively with them.

Monitoring and Correcting Performance: Distinguishing trends, predicting impacts of actions on system operations, diagnosing deviations in the functioning of a system/organization, and taking necessary steps to correct performance.

Improving or Designing Systems: Making suggestions to modify existing systems in order to improve the quality of products or services and developing new or alternative systems.

TECHNOLOGY

Selecting Technology: Judging which sets of procedures, tools or machines, including computers and their programs, will produce the desired results.

Applying Technology to Tasks: Understanding overall intent and proper procedures for setting up and operating machines, including computers and their reprogramming systems.

Maintaining and Troubleshooting Equipment: Preventing, identifying, or solving problems with equipment, including computers and other technologies.
Section III: RELATIONSHIP TO COLLEGE PROGRAMS

1. THIS COURSE WILL BE AN APPROVED REQUIREMENT FOR AN APPROVED ASSOCIATE DEGREE OR CERTIFICATE PROGRAM: Yes

   a. If yes, the course will be a Not applicable portion of the “approved program” listed on the State Chancellor’s Inventory of Approved Programs (approved programs can be found on the State Chancellor’s Office website at http://misweb.cccco.edu/esed/webproginv/prod/invmenu.htm.

      Associate in Science in Mathematics

   NOTE: In order for a course to be approved as a requirement for an associate degree or certificate program, the program must be listed on the State Chancellor’s Office Inventory of Approved Programs AND the course must be listed in the college catalog as either a requirement or an elective for the program. If course is not part of an approved program at the college adopting the course, it will be considered to be a “stand-alone” course, and is subject to the State Chancellor’s approval criteria. The college must complete and submit the Chancellor’s Office “APPLICATION FOR APPROVAL OF CREDIT” form. Certain courses are granted “blanket approval” by the State Chancellor’s Office and do not require separate approval. See the Chancellor’s Office Program and Course Approval Handbook for details. LACCD Skills Certificates are not State approved programs and are not listed on the Chancellor’s Office Inventory of Approved Programs.

2. GENERAL EDUCATION REQUIREMENTS FOR THE ASSOCIATE DEGREE STATUS:

   a. Area requested: None Approval date:

      If applicable, provide an explanation of how the course meets the General Education parameters for one of the five general education areas – Natural Sciences, Social and Behavioral Sciences, Humanities, Language and Rationality, Health and Physical Education -- contained in Board Rule 6201.14 -General Education Requirements.
      http://marlin.laccd.edu/district/BoardRules_AdmRegs/boardrules.htm

       a. 2nd Area requested: None Approval date:

Mathematics 2008-09
If applicable, provide an explanation of how the course meets General Education parameters for an additional general education area – Natural Sciences, Social and Behavioral Sciences, Humanities, Language and Rationality, Health and Physical Education -- contained in Board Rule 6201.14 - General Education Requirements.http://marlin.laccd.edu/district/BoardRules_AdmRegs/boardrules.htm
Section IV: ARTICULATION INFORMATION

(Complete in consultation with College Articulation Officer)

1. TRANSFER STATUS:

   a. Transferable to the University of California: Yes
   b. UC approval date:
   c. Transferable to the California State University: No
   d. College approval date:

2. GENERAL EDUCATION FOR TRANSFER:

   IGETC Certification:
   a. Area requested: None
   b. Date requested:
   c. IGETC approval date:

   If applicable, provide an explanation of how the course meets the appropriate General Education parameters, as defined in IGETC Certification Guidelines.

   CSU Certification:
   a. Area requested: None
   b. Date requested:
   c. CSU approval date:

   If applicable, provide an explanation of how the course meets the appropriate General Education parameters, as defined in CSU Certification Guidelines.

   a. 2nd Area requested: None
   b. Date requested:
   c. IGETC approval date:

   If applicable, provide an explanation of how the course meets the appropriate General Education parameters, as defined in IGETC Certification Guidelines.

   a. 2nd Area requested: None
   b. Date requested:
   c. CSU approval date:

   If applicable, provide an explanation of how the course meets the appropriate General Education parameters, as defined in CSU Certification Guidelines.
3. **MAJOR REQUIREMENT FOR TRANSFER** – Will this course be articulated to meet lower division major requirements? **NO**

List college/university and the majors:

<table>
<thead>
<tr>
<th>College/University</th>
<th>Major(s)</th>
</tr>
</thead>
</table>

**CAN NUMBER:**  **CAN SEQUENCE NUMBER:**
Section V: SUPPLEMENTAL COURSE INFORMATION

1. DEPARTMENT/DIVISION NAME: Mathematics/Math-Phy-Sci and Tech

2. DEPARTMENT/DIVISION CODE: 45

3. SUBJECT CODE -- 3 characters, assigned by District Office: 589 (existing subject codes are available on the LACCD web site at http://www.laccd.edu/curriculum/directory-programs-courses/index.htm

4. SUBJECT ABBREVIATION -- 7 characters, assigned by District Office: Math

5. SPC CODE -- 3 characters, assigned by District Office: 742

6. ABBREVIATION FOR TRANSCRIPTS -- 20 characters, assigned by District Office: Math

7. DEGREE CREDIT: Indicate whether the course meet the “standards for approval” for degree credit course set forth in Title 5, section 55002(a)(2), which requires the course to have a degree of intensity, difficulty, and vocabulary that the curriculum committee has determined to be at the college level: This courses is Degree Applicable

8. CREDIT/NO CREDIT GRADING: No

9. REPETITIONS -- Number of times course may be repeated for credit (three maximum): 0

10. PRIOR TO TRANSFERABLE LEVEL – This course attribute applies to English, writing, ESL, reading and mathematics courses ONLY. If applicable, indicate how many levels below the transferable level this course should be placed: Not applicable

11. CREDIT BASIC SKILLS -- Title 5, section 55502(d) defines basic skills as “courses in reading, writing, computation, and English as a Second Language, which are designated as non-degree credit courses pursuant to Title 5, section 55002(b).” No If Yes, course must be non-degree applicable.
12. CROSS REFERENCE -- Is this course listed as equivalent in content to existing College/District courses in another discipline?  
No

If Yes, list courses (documentation of cross-discipline agreement must be provided):

13. COURSE SPECIFICALLY DESIGNED FOR STUDENTS WITH DISABILITIES -- Title 5, section 56029 allows a course to be repeatable when continuing success of the students with disabilities is dependent on additional repetitions of a specific class. Is this course designated as an “approved special class” for students with disabilities?  
No

If yes, provide an explanation of how this course meets the requirements of Title 5, section 56029.

14. COOPERATIVE EDUCATION STATUS -- Title 5, section 55252 allows for two types of Cooperative Education: 1) General Work Experience Education -- i.e., supervised employment, which is intended to assist students in acquiring desirable work habits, attitudes and career awareness, which need not be related to the students’ educational goals; or 2) Occupational Work Experience Education -- i.e., supervised employment, extending classroom based occupational learning at an on-the-job learning station, which is related to the students' educational or occupational goal. Is this course part of the college’s approved cooperative work experience education program?  
No

15. COURSE CLASSIFICATION: Liberal Arts Sciences

Note: A course’s Classification, TOP Code and SAM code must be aligned – e.g., Courses with an “Occupational” Course Classification must have an “Occupational” TOP Code and a SAM Code of A, B, C, or D; courses that do not have an “Occupational” Course Classification cannot have an Occupational TOP Code and must have an “E” SAM Code. Courses coded as “basic skills” in #11 should be coded “Adult and Secondary Basic Skills.”

16. TOP CODE – (6 digits XXXX.XX)  1701. 00

Course content should match discipline description in Taxonomy of Programs found at www.cccco.edu/cccco/esed/curric/curriculum.htm.

17. SAM CODE (Student Accountability Model): E - Non-Occupational

SAM Codes (see CCC Chancellor’s Office Student Accountability Model Operations Manual, 1984) should be assigned as follows:

Priority "A" – Apprenticeship: Courses designed for an indentured apprentice must have the approval of the State of California, Department of Industrial Relations Department, Division of Apprenticeship Standards.
Priority "B" – Advanced Occupational: Courses taken by students in the advanced stages of their occupational programs. Courses should be offered in one specific occupational area only. Priority letter "B" should be assigned sparingly; in most cases, no more than two courses in any one program should be labeled “B.” “B”-level courses must have Priority “C” prerequisites in the same program area.

Priority "C" – Clearly Occupational: Courses generally taken by students in the middle stages of their programs should have a difficulty level sufficient to detract "drop-ins." Courses may be offered in several occupational programs within a broad area. The "C" priority, however, should also be used for courses within a specific program area when the criteria for "B" classification are not met. A "C"-level course should provide the student with entry-level job skills.

Priority "D" -- Possibly Occupational: "D" courses are those taken by students in the beginning stages of their occupational programs. The "D" priority can also be used for service (or survey) courses for other occupational programs.

Priority "E" -- Non-occupational.
SECTION VI: APPROVAL STATUS

1. APPROVAL STATUS:
   
a. □ New Course
   
   . Board Approval Date: . Effective Semester:
   
b. □ Addition of Existing District Course
   
   . College Approval Date: . Effective Semester:
   
c. □ Course Change*
   
   . College Approval Date: . Effective Semester:
   
d. ☑ Outline Update
   
   . College Approval Date: 09/04/09

   (*) Changes to a course require the completion of a “Course Change Request” form and approval by the college’s Curriculum Committee. In some cases districtwide approval is also required; see, Administrative Regulation E-65, section 3(c) for details.

SECTION VII: APPROVAL INFORMATION FOR NEW OR ADDED COURSES

(complete in consultation with Department Chair and the appropriate Academic Administrator)

1. ORIGINATOR: L McKenzie

2. DEPARTMENT: Mathematics

3. IF THIS IS A NEW COURSE, INDICATE HOW THE COLLEGE PLANS TO MEET THE EXPENSE OF THIS COURSE:

   □ By additional funds. Describe:
   
   
   □ By deleting courses from the college catalog and course database. List specific courses to be deleted:
   
   
   □ By deleting sections of existing courses. List courses and number of sections to be deleted:

   First year: Second year: Third year:
By rotating sections of existing courses. List courses and number of sections to be rotated, as well as the semesters in which they will be offered:

4. IMPACT -- Will this course directly impact other course offerings and/or associate degree or certificate programs on campus?  
   No  (If yes, briefly explain how)

5. METHOD OF SUPPORT -- Indicate how the college plans to support the proposed course:

   Additional staff -- List additional staff needed:

   None

   Classroom -- List classroom type needed:

   Regular lecture

   Equipment -- List new equipment needed and indicate funding source for any new equipment:

   N/A

   Supplies- List supplies and indicate dollar value:

   N/A

   Library/Learning Resources- The course initiator shall consult with the College Librarian and review the college library, book, periodical, and electronic resource collections relevant to this course. List additional titles and resources to be considered for purchase as funding permits:

   Adequate
CERTIFICATION AND RECOMMENDATION

☒ This course meets Title 5 requirements for Associate Degree applicable college credit towards an Associate of Arts Degree.

☐ This course meets Title 5 requirements but does not satisfy the requirements for an Associate Degree applicable course.

We certify that the information and answers above properly represent this course.

________________________________________________________________________  ______________________________________________________________________
Originator                                                      Date

________________________________________________________________________  ______________________________________________________________________
Department/Cluster Chairperson                                  Date

________________________________________________________________________  ______________________________________________________________________
Articulation Officer                                            Date

________________________________________________________________________  ______________________________________________________________________
Librarian                                                       Date

________________________________________________________________________  ______________________________________________________________________
Dean (if applicable)                                            Date

________________________________________________________________________  ______________________________________________________________________
Curriculum Committee Chairperson                               Date

Mathematics 2008-09          36
**DEPARTMENT/DIVISION NAME**: Mathematics/Math-Phy-Sci and Tech

**DEPARTMENT/DIVISON CODE**: 45

**SUBJECT (DISCIPLINE) NAME**: Mathematics

**SUBJECT CODE** -- 3 characters, assigned by District Office: 589

**SUBJECT ABBREVIATION** -- 7 characters, assigned by District Office: Math

**COURSE TITLE**: Ordinary Differential Equations

**COURSE NUMBER**: 275

**UNITS**: 3

**CLASS HOURS**:

<table>
<thead>
<tr>
<th></th>
<th>Hours per week (based on 18 weeks)</th>
<th>Total Hours per term (hrs per week x 18)</th>
<th>Units</th>
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</thead>
<tbody>
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<td>Lecture</td>
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<td>Lab/activity (w/homework)</td>
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<td>0.00</td>
</tr>
<tr>
<td>Lab/activity (w/o)</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>3.00</td>
<td>54.00</td>
<td>3.00</td>
</tr>
<tr>
<td>------------------</td>
<td>------</td>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DEGREE CREDIT:** Indicate whether the course meet the "standards for approval" for degree credit course set forth in Title 5, section 55002(a)(2), which requires the course to have a degree of intensity, difficulty, and vocabulary that the curriculum committee has determined to be at the college level: This course is **Degree Applicable**

**THIS COURSE WILL BE AN APPROVED REQUIREMENT FOR AN APPROVED ASSOCIATE DEGREE OR CERTIFICATE PROGRAM:**
If yes, the course will be a Not applicable portion of the “approved program” listed on the State Chancellor’s Inventory of Approved Programs (approved programs can be found on the State Chancellor’s Office website at

**GENERAL EDUCATION FOR TRANSFER:**
Area requested: **None** Approval date:

**GENERAL EDUCATION REQUIREMENTS FOR THE ASSOCIATE DEGREE STATUS:**
Area requested: **None** Approval date:
2nd Area requested: **None** Approval date:

**TRANSFER STATUS:**
Transferable to the University of California: **Yes** UC approval date:
Transferable to the California State University: **No** College approval date:

**GENERAL EDUCATION FOR TRANSFER: **Yes

IGETC
Area requested: **None** Date requested: IGETC approval date:

CSU CERTIFICATION **None**
Date requested: CSU approval date:

**ABBREVIATION FOR TRANSCRIPTS** -- 20 characters, assigned by District Office: **Math**
COURSE CLASSIFICATION: Liberal Arts Sciences

TOP CODE – (6 digits XXXX.xx) 1701.00

SAM CODE (Student Accountability Model): E - Non-Occupational

PREREQUISITES, COREQUISITES, ADVISORIES ON RECOMMENDED PREPARATION, and LIMITATION ON ENROLLMENT
Prerequisites: Yes   (If Yes, complete information below)
Corequisite:  None  (If Yes, complete information below)

CREDIT/NO CREDIT GRADING: No

REPETITIONS -- Number of times course may be repeated for credit (three maximum): 0

CROSS REFERENCE -- Is this course listed as equivalent in content to existing College/District courses in another discipline? No

CREDIT BASIC SKILLS -- Title 5, section 55502(d) defines basic skills as "courses in reading, writing, computation, and English as a Second Language, which are designated as non-degree credit courses pursuant to Title 5, section 55002(b)."  No  If Yes, course must be non-degree applicable

COURSE SPECIFICALLY DESIGNED FOR STUDENTS WITH DISABILITIES -- Title 5, section 56029 allows a course to be repeatable when continuing success of the students with disabilities is dependent on additional repetitions of a specific class. Is this course designated as an "approved special class" for students with disabilities? No

APPROVAL STATUS:
New Course

Board Approval Date:
Effective Semester:

Addition of Existing District Course

College Approval Date:

COOPERATIVE EDUCATION STATUS -- Title 5, section 55252 allows for two types of Cooperative Education: 1) General
Work Experience Education -- i.e., supervised employment, which is intended to assist students in acquiring desirable work habits, attitudes and career awareness, which need not be related to the students' educational goals; or 2) Occupational Work Experience Education -- i.e., supervised employment, extending classroom based occupational learning at an on-the-job learning station, which is related to the students' educational or occupational goal. Is this course part of the college's approved cooperative work experience education program? No

CATALOG COURSE DESCRIPTION -- Provide a description of the course, including an overview of the topics covered:

| This course introduces the theory and applications of ordinary differential equations with emphasis on applications in the physical sciences. Traditional methods of solution by closed forms are studied together with series solutions, numerical methods and Laplace transforms solutions. |

CLASS SCHEDULE COURSE DESCRIPTION -- Provide a brief description of the course, including an overview of the topics covered:

| This course introduces the theory and applications of ordinary differential equations with emphasis on applications in the physical sciences. Traditional methods of solution by closed forms are studied together with series solutions, numerical methods and Laplace transforms solutions. |

SPC CODE -- 3 characters, assigned by District Office: 742
## PREREQUISITE, COREQUISITE OR ADVISORY CONTENT REVIEW

### Prerequisite

**All courses: Content Review Validation**

Provide evidence that skills and knowledge acquired in the proposed prerequisite course are necessary for student success in the course by completing the **Content Validation Table** below.

1. List the skills or knowledge contained in the prerequisite course. (These items should be incorporated into the learning objectives of this course).
2. List skills or knowledge necessary for students to succeed in the requisite course for which the Prerequisite is proposed.

Certified by:

<table>
<thead>
<tr>
<th>Requisite Course Subject, Number, Title: Mathematics 267 – Calculus III</th>
<th>Target Course Subject, Number, and Title: Mathematics 275 – Ordinary Differential Equations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>COLUMN 1: COURSE OBJECTIVES</strong>&lt;br&gt;- EXIT SKILLS&lt;br&gt; (List all exit skills, repeat if needed)</td>
<td><strong>COLUMN 2: TARGET COURSE - ENTRY SKILLS</strong>&lt;br&gt;(List all entry skills, repeat if needed)</td>
</tr>
<tr>
<td>Graph of functions in rectangular and polar coordinates.&lt;br&gt;Areas using polar coordinates&lt;br&gt;Graphs of functions in parametric form.&lt;br&gt;Equations of tangent and normal lines to a curve&lt;br&gt;Arc length of a curve</td>
<td>Graph of functions in rectangular and polar coordinates.&lt;br&gt;Areas using polar coordinates&lt;br&gt;Graphs of functions in parametric form.&lt;br&gt;Equations of tangent and normal lines to a curve&lt;br&gt;Arc length of a curve</td>
</tr>
<tr>
<td>Interpret rectangular coordinates in 3 space; vectors in R-3and R-2; compute tangent and normal vectors, curvature; graph lines in 3-Space&lt;br&gt;Compute scalar product; vector product; scalar triple product.&lt;br&gt;Multiply and differentiate using vectors&lt;br&gt;Draw curves in 3-space&lt;br&gt;Draw quadric surfaces using spherical and cylindrical coordinates</td>
<td>Interpret rectangular coordinates in 3 space; Vectors in R-3and R-2; compute tangent and normal vectors, curvature; graph lines in 3-Space&lt;br&gt;Compute scalar product; vector product; scalar triple product. Multiply and differentiate using vectors&lt;br&gt;Draw curves in 3-space&lt;br&gt;Draw quadric surfaces using spherical and cylindrical coordinates</td>
</tr>
<tr>
<td>Partial derivatives, chain rule; directional Derivative, gradient, tangent planes; functions in n-variables; maxima and minima of function of 2-variables; Method of Lagrange multipliers</td>
<td>Partial derivatives, chain rule; directional Derivative, gradient, tangent planes; functions in n-variables; maxima and minima of function of 2-variables; Method of Lagrange multipliers</td>
</tr>
</tbody>
</table>
Double and triple integrals using rectangular, polar, cylindrical and spherical coordinates. Surface area, centroids, center of mass and gravity.

Line integrals, Green's Theorem. Surface integrals. Divergence theorem

Select the most appropriate basis for validation and provide the necessary documentation: (Mouse over • for details.)

- Advisories/recommended prerequisites.
- Course within the same discipline.
- Course outside of discipline closely related but not English or Math.
- Required by a four year transfer institution.
- Computation or Communication Skill courses outside of a discipline.
- Health and Safety.
- Imposed by law or contract.
- Program prerequisites
- Recency, GPA, and Other Measures of Readiness Prerequisites.
- Placement based on skills assessment

DISCIPLINE FACULTY HAVE REVIEWED THE PREREQUISITE/COREQUISITE AND TARGET COURSE SKILLS LISTED ABOVE AND HAVE DETERMINED THAT TAKING THE PREREQUISITE/COREQUISITE COURSE WILL PROVIDE CONCEPTS/SKILLS NECESSARY FOR SUCCESS IN THE TARGET COURSE. FOR ADVISORY COURSES, THE DISCIPLINE FACULTY HAVE DETERMINED THAT TAKING THE ADVISORY COURSE WILL BROADEN AND/OR DEEPEN STUDENT LEARNING, BUT IS NOT REQUIRED FOR SUCCESS, IN THE TARGET COURSE.

Discipline Faculty:

_______________________________     ______________
Signature         Date

_______________________________     ______________
Signature         Date

_______________________________     ______________________ _  Division Chairperson

Mathematics 2008-09
**Institutional Mission and Goals** | **Course Intended Outcomes** | **Means of Assessment and Criteria for Success** | **Summary of Data Collected** | **Use of Results** |
---|---|---|---|---|
1 | 1. Identify the type, order and solution method for various differential equations | **Means:** Embed problems in the final exam. Collect the work from all students with names and scores. **Criteria:** 50% of the class will demonstrate satisfactory performance of 3 or higher on these problems based upon a math department scoring rubric. | | Analyze the outcomes to determine issues such as: do the exercises assess the SLO clearly |
2 | 2. Reduce the order of a differential equation | **Means:** Embed problem in the final exam. Collect the work from all students with names and scores. **Criteria:** 50% of the class will demonstrate satisfactory performance of 3 or higher on these problems based upon a math department scoring rubric. | | |
2 | 3. Solve differential equations with constant and variable coefficients | **Means:** Embed problem in the final exam. Collect the work from all students with names and scores. **Criteria:** 50% of the class will demonstrate satisfactory performance of 3 or higher on these problems based upon a math department scoring rubric. | | |
<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>4. Solve linear and non-linear differential equations</td>
<td><strong>Means:</strong> Embed problem in the final exam. Collect the work from all students with names and scores. <strong>Criteria:</strong> 50% of the class will demonstrate satisfactory performance of 3 or higher on these problems based upon a math department scoring rubric.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>5. Solve systems of differential equations</td>
<td><strong>Means:</strong> Embed problems in the final exam. Collect the work from all students with names and scores. <strong>Criteria:</strong> 50% of the class will demonstrate satisfactory performance of 3 or higher on these problems based upon a math department scoring rubric.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>6. Apply the method of La Place Transforms</td>
<td><strong>Means:</strong> Embed problem in the final exam. Collect the work from all students with names and scores. <strong>Criteria:</strong> 50% of the class will demonstrate satisfactory performance of 3 or higher on these problems based upon a math department scoring rubric.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>7. Solve differential equations using numerical approximations</td>
<td><strong>Means:</strong> Embed problem in the final exam. Collect the work from all students with names and scores. <strong>Criteria:</strong> 50% of the class will demonstrate satisfactory performance of 3 or higher on these problems based upon a math department scoring rubric.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>8. Solve word problems involving differential equations</td>
<td><strong>Means:</strong> Embed problem in the final exam. Collect the work from all students with names and scores. <strong>Criteria:</strong> 50% of the class will</td>
<td></td>
</tr>
</tbody>
</table>
demonstrate satisfactory performance of 3 or higher on these problems based upon a math department scoring rubric.
COURSE OBJECTIVES
To introduce the student to topics in differential equations and their applications to science and engineering. To encourage critical thinking.

UNITS: Three (3) CSU: UC-transferable

PREREQUISITES: Completion of Math 267 with a grade of "C" or better, or concurrent enrollment.

MATERIALS REQUIRED:
A First Course in Differential Equations – Zill- 6th ed, Houghton/Mifflin

CLASS FORMAT: One and a half(1 1/2) hours, twice a week, of lecture, discussion and practice on theory and applications. Class participation is part of the curriculum.

STUDY HABITS: At least two(2) hours per day, seven(7) days a week of study to keep current with the course.

ASSIGNMENTS: Do all assigned work, it is an integral part of learning mathematics. Forty percent of your grade will be determined by homework assignments.

EVALUATION: Grading for all exams, assignments and course grade will be based on the following percentage distribution:

- 100 - 90% A
- 89 - 78% B
- 77 - 60% C
- 59 - 40% D
- 39 - 0% F

Grade distribution for the course will be approximately as follows:

- Midterm Exam 30% - 100 pts
- Assignments/quizzes 40% - 133 pts
- Final exam 30% - 100 pts
- Total 100% - 333 pts

ATTENDANCE: Be here. Class participation and attendance will be part of your grade.

OFFICE HOURS: 9:30 - 11:00 A.M. MW in NEAC 232
or by appointment Phone: 310-233-4500
e-mail: Laplacep@lahc.edu

OUTSIDE HELP: MATH LAB: 8:00 AM - 8:00 PM M Tu W Th
8:00 AM - 2:00 PM F

IMPORTANT DATES:
3/03/07 Last day to drop without a "W"
3/03/07 Last day to option for "CR/NCR" grade
3/21 - 3/26 Spring Recess
4/05/07 Midterm exam
5/05/07 Last day to drop with a "W"
6/02/07 Final exam – 10:30 – 12:30 Noon

Mathematics 2008-09 48
<table>
<thead>
<tr>
<th>Topic or Activity</th>
<th>Time Allocated</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Types of differential equations: separable variables, exact and linear equations, substitution methods, linear, homogeneous and non-homogeneous equations reduction in order of a differential equation with constant coefficients. Applications</td>
<td>12 hours</td>
<td>State and apply solution methods and theorems related to ordinary differential equations</td>
</tr>
<tr>
<td>Solution of differential equations with constant coefficients: undetermined coefficients, annihilator variation of parameters and Cauchy-Euler methods. Applications</td>
<td>9 hours</td>
<td>State and apply solution methods and theorems related to ordinary differential equations</td>
</tr>
<tr>
<td>Systems of linear differential equations, nonlinear differential equations</td>
<td>9 hours</td>
<td>State and apply solution methods and theorems related to ordinary differential equations</td>
</tr>
<tr>
<td>Modeling with differential equations: initial value problems, spring mass systems, boundary value problems</td>
<td>9 hours</td>
<td>Formulate sophisticated methods of problem solving and critical thinking using differential equations</td>
</tr>
<tr>
<td>Solution of differential equations using power series</td>
<td>6 hours</td>
<td>Develop techniques for applying differential equations to the solution of problems arising in science and engineering</td>
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</table>
Executive Summary

<table>
<thead>
<tr>
<th>Selected Occupations</th>
<th>Education Level</th>
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</thead>
<tbody>
<tr>
<td>Computer and information scientists, research (SOC 15-1011)</td>
<td>Doctoral degree</td>
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<tr>
<td>Computer programmers (SOC 15-1021)</td>
<td>Bachelor's degree</td>
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<tr>
<td>Computer software engineers, applications (SOC 15-1031)</td>
<td>Bachelor's degree</td>
</tr>
<tr>
<td>Computer software engineers, systems software (SOC 15-1032)</td>
<td>Bachelor's degree</td>
</tr>
<tr>
<td>Computer support specialists (SOC 15-1041)</td>
<td>Associate's degree</td>
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<tr>
<td>Computer systems analysts (SOC 15-1051)</td>
<td>Bachelor's degree</td>
</tr>
<tr>
<td>Database administrators (SOC 15-1061)</td>
<td>Bachelor's degree</td>
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<tr>
<td>Network and computer systems administrators (SOC 15-1071)</td>
<td>Bachelor's degree</td>
</tr>
<tr>
<td>Computer specialists, all other (SOC 15-1099)</td>
<td>Associate's degree</td>
</tr>
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</table>

Basic Information

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>2007 Occupational Jobs</td>
<td>142,353</td>
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<tr>
<td>2017 Occupational Jobs</td>
<td>172,964</td>
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<tr>
<td>Total Change</td>
<td>30,611</td>
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<td>Total % Change</td>
<td>21.5%</td>
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<tr>
<td>2007 Median Hourly Earnings</td>
<td>$34.21</td>
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</table>

Occupational Change Summary
Region Information

Harbor - MSA

Description: LB, Sta Ana Metropolitan Area

Counties: Los Angeles, CA (6037), Orange, CA (6059)
Executive Summary

<table>
<thead>
<tr>
<th>Selected Occupations</th>
<th>Education Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerospace engineering and operations technicians (SOC 17-3021)</td>
<td>Associate's degree</td>
</tr>
<tr>
<td>Civil engineering technicians (SOC 17-3022)</td>
<td>Associate's degree</td>
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<tr>
<td>Electro-mechanical technicians (SOC 17-3024)</td>
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<tr>
<td>Mechanical engineering technicians (SOC 17-3027)</td>
<td>Associate's degree</td>
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<tr>
<td>Engineering technicians, except drafters, all other (SOC 17-3029)</td>
<td>Associate's degree</td>
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</table>

Basic Information

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<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>2007 Occupational Jobs</td>
<td>10,631</td>
</tr>
<tr>
<td>2017 Occupational Jobs</td>
<td>11,719</td>
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<tr>
<td>Total Change</td>
<td>1,088</td>
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<td>Total % Change</td>
<td>10.22%</td>
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<td>2007 Median Hourly Earnings</td>
<td>$23.97</td>
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Occupational Change Summary

<table>
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<tr>
<th>Region</th>
<th>2007 Jobs</th>
<th>2017 Jobs</th>
<th>Change</th>
<th>% Change</th>
<th>2007 Median Hourly Earnings</th>
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<tr>
<td>Regional Total</td>
<td>10,631</td>
<td>11,719</td>
<td>1,088</td>
<td>10%</td>
<td>$23.97</td>
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<td>Total</td>
<td>State</td>
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<td>30,695</td>
<td>245,864</td>
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<td>3,309</td>
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<td>11%</td>
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Source: EMSI Complete Employment - Spring 2008 Release v. 2
A total of 38 students from the two high schools were assessed in ENL, ESL and MATH in 2009.


a. Within class retention

<table>
<thead>
<tr>
<th>Fall</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
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<tbody>
<tr>
<td>Astronomy</td>
<td>88.1%</td>
<td>93.7%</td>
<td>80.3%</td>
<td>82.3%</td>
<td>92.0%</td>
</tr>
<tr>
<td>Chemistry</td>
<td>84.8%</td>
<td>79.9%</td>
<td>87.2%</td>
<td>86.5%</td>
<td>89.2%</td>
</tr>
<tr>
<td>Co Science</td>
<td>75.7%</td>
<td>79.5%</td>
<td>70.6%</td>
<td>85.8%</td>
<td>83.9%</td>
</tr>
<tr>
<td>Co Tech</td>
<td>88.2%</td>
<td>86.3%</td>
<td>78.6%</td>
<td>81.9%</td>
<td>78.8%</td>
</tr>
<tr>
<td>Drafting</td>
<td>80.0%</td>
<td>82.5%</td>
<td>99.2%</td>
<td>78.8%</td>
<td>92.8%</td>
</tr>
<tr>
<td>Electronics</td>
<td>78.6%</td>
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<td>0.0%</td>
<td>55.6%</td>
<td>82.5%</td>
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<tr>
<td>Engineering Gen</td>
<td>60.0%</td>
<td>66.7%</td>
<td>100.0%</td>
<td>91.2%</td>
<td>97.6%</td>
</tr>
<tr>
<td>Engineering Tech</td>
<td>77.8%</td>
<td>79.2%</td>
<td>65.2%</td>
<td>76.7%</td>
<td>90.8%</td>
</tr>
<tr>
<td><strong>Math</strong></td>
<td><strong>76.3%</strong></td>
<td><strong>77.2%</strong></td>
<td><strong>72.8%</strong></td>
<td><strong>73.3%</strong></td>
<td><strong>72.3%</strong></td>
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<tr>
<td>Physical Science</td>
<td>80.6%</td>
<td>57.1%</td>
<td>60.4%</td>
<td>71.9%</td>
<td>69.5%</td>
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<tr>
<td>Physics</td>
<td>63.9%</td>
<td>79.8%</td>
<td>86.7%</td>
<td>89.3%</td>
<td>89.5%</td>
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<tr>
<td>Process Plant</td>
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<tr>
<td>Tech</td>
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<td>83.0%</td>
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</tr>
<tr>
<td>Statistics</td>
<td>94.3%</td>
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<td>97.4%</td>
</tr>
<tr>
<td><strong>Division Rates</strong></td>
<td><strong>78.1%</strong></td>
<td><strong>78.9%</strong></td>
<td><strong>75.4%</strong></td>
<td><strong>76.7%</strong></td>
<td><strong>77.7%</strong></td>
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<tr>
<td>College Rates</td>
<td>83.7%</td>
<td>84.5%</td>
<td>83.4%</td>
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<tr>
<td><strong>State Rate(math)</strong></td>
<td><strong>75%</strong></td>
<td><strong>76%</strong></td>
<td><strong>75%</strong></td>
<td><strong>76%</strong></td>
<td><strong>75%</strong></td>
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</table>
b. Within class successful completion rates

<table>
<thead>
<tr>
<th>Fall</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
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<tbody>
<tr>
<td>Astronomy</td>
<td>74.1%</td>
<td>73.2%</td>
<td>69.7%</td>
<td>61.7%</td>
<td>79.1%</td>
</tr>
<tr>
<td>Chemistry</td>
<td>63.3%</td>
<td>66.2%</td>
<td>74.0%</td>
<td>77.3%</td>
<td>72.6%</td>
</tr>
<tr>
<td>Co Science</td>
<td>53.8%</td>
<td>58.3%</td>
<td>47.6%</td>
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<td>55.6%</td>
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<tr>
<td>Co Tech</td>
<td>74.6%</td>
<td>69.4%</td>
<td>61.3%</td>
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<td>59.6%</td>
</tr>
<tr>
<td>Drafting</td>
<td>67.5%</td>
<td>69.1%</td>
<td>67.5%</td>
<td>66.3%</td>
<td>72.2%</td>
</tr>
<tr>
<td>Electronics</td>
<td>78.6%</td>
<td>100.0%</td>
<td>0.0%</td>
<td>55.6%</td>
<td>80.0%</td>
</tr>
<tr>
<td>Engineering Gen</td>
<td>40.0%</td>
<td>58.3%</td>
<td>81.8%</td>
<td>88.2%</td>
<td>24.4%</td>
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<tr>
<td>Engineering Tech</td>
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<td>32.5%</td>
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<tr>
<td>Math</td>
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<td>50.4%</td>
<td>47.9%</td>
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<tr>
<td>Physics</td>
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<td>70.0%</td>
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<td>75.4%</td>
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<tr>
<td>Physical Science</td>
<td>46.8%</td>
<td>32.7%</td>
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<td>25.4%</td>
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<td></td>
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<tr>
<td>Tech</td>
<td>n/a</td>
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<td>Statistics</td>
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<td>76.3%</td>
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<td>50.2%</td>
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<td>College Rates</td>
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c. Internal SCAN—Efficiency


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b. Fall 2007 Detail (Source: BW i22report):  

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<th>Total FTES</th>
<th>Total WSCH</th>
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<td>7.3, 7.4</td>
<td>To facilitate student learning via qualified faculty and staff</td>
<td>Monitor/enforce contractual and participatory governance agreements involving administration, faculty and staff. Make periodic request through FHPC, Senate, Academic Affairs and President’s Offices</td>
<td>Program 100</td>
<td>$1.23 M per year</td>
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<td>To provide students with up to date classroom/laboratory equipment and supplies</td>
<td>Purchase necessary contemporary classroom/laboratory equipment and supplies</td>
<td>Program 100, Bloc Grant</td>
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<td>To provide a stable and viable student tutorial service</td>
<td>Hire peer tutors for Math Lab, student worker to assist in Chemistry stockroom and technology labs</td>
<td>Program 100</td>
<td>$8K per year</td>
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<td>4, A</td>
<td>1.1, 1.3, 5.2</td>
<td>To provide quality instruction to students and aim for 54% class retention in all courses</td>
<td>Assign trained readers to classes to increase graded homework output. Perform periodic evaluation of course placement cut scores.</td>
<td>A pool of qualified readers. Viable research data. Cooperative staff</td>
<td>$4K per year</td>
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<td>To expose students to current technology in and out of the classroom</td>
<td>Update classrooms and laboratories on a regular basis</td>
<td>Bloc Grant and VATEA funds Training for faculty</td>
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<td>To increase student’s science awareness in the community</td>
<td>Foster partnerships with LAUSD and PVUSD. Offer college courses in local HS for qualified students. Schedule college courses in such a way that qualified HS students can enroll. Schedule Chemistry</td>
<td>STARS for Kids Program, Drafting classes at Peninsula HS, PLTW program, Comp Sci courses at Narbonne HS, Comp Tech courses at Banning HS</td>
<td>$20K</td>
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<td>7</td>
<td>1.1, 1.3, 5.2</td>
<td>To Support student success initiatives for basic skills and entry level courses</td>
<td>Lower class size limits for entry-level courses. Add skills/discussion lab TBA. Provide supplemental instruction. Assign peer tutors to work with faculty in the classroom. Enforce course pre-requisites. Explore new teaching techniques. Develop new courses such as Math Anxiety, Study Skills and Ethics. Reintroduce a self paced elementary algebra section. Offer short term courses during regular semesters. Offer on-going modules for entry-level courses. Introduce hybrid courses.</td>
<td>Program 100. Admissions and records</td>
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<td>To address the college mission on workforce development by preparing students for immediate employment in local oil refineries</td>
<td>Restart Process Plant Tech Program Foster partnerships with local industry and trade unions. Submit PNPR for Process Pant AS degree and Instrumentation AS degree. Seek funding for an instrumentation laboratory.</td>
<td>State/Conoco Phillips/Valero/Mobil Oil/SBCC/AWU Grant to fund classes</td>
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<td>To address the college mission on workforce development by training students in craft skills that could lead to immediate</td>
<td>Add basic craft skills courses such as electrical. Continue to schedule drafting courses</td>
<td>Grants to fund classes and equipment. Program 100</td>
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<td>To provide students with additional basic skills preparation</td>
<td>Add more sections of existing basic skills courses. Introduce new courses related to math test taking skills, employment, GED, etc. (Math 140).</td>
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<td>To provide students with easy to read and erase slate boards in classrooms and laboratories</td>
<td>Request through CPC. Monitor construction phase of new buildings</td>
<td>Prop A/AA funds.</td>
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<td>To provide students with up to date planetarium</td>
<td>Request through CPC. Monitor renovation phase. Work with College Foundation to find sponsors for a new planetarium projector</td>
<td>Prop A/AA funds. SFP grants and donations</td>
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<td>To ensure that students have continual access to modern and leading edge laboratory equipment</td>
<td>Install security systems in locations housing laboratory equipment to protect costly investments.</td>
<td>Prop A/AA or State Deferred Maintenance funds</td>
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<td>Install Smart Board, computer projector in classroom and laboratories</td>
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<td>Package existing college courses into a viable certificates and programs. Coordinate with Life Sciences Dept.</td>
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Executive Summary

The Mathematics Department faculty thanks the external validation team for its thorough review of the documents submitted and addresses its recommendations as follows:

I. The department will continue to rely and build on the strengths noted by the validation team such as
   a. maintain the quality and rigor of mathematics courses with current course outline content and SLO’s assessment. In priority #7 of the 2009-10 Unit Plan, faculty in the Math-Phy-Sci and Tech Division outline goals to improve teaching learning-skills strategies that would benefit all students
   b. encouraging more transfers students to pursue engineering, mathematics and science degrees particularly with pending new State of California blended apportionment funding. See 2009-10 Unit Plan priority #4
   c. scheduling classes that addresses the needs of our student population during days, evenings, Saturdays, early morning (6:55 a.m.) and distance learning
   d. seeking funding to expand early diagnostic and intervention programs like the Math Jam

II. The department acknowledges the concerns noted by the validation team
   a. department has a completion rate of 48.8% compared to the state average of 53%
   b. ratio of full-time to part-time faculty has decreased rapidly from 52% FT:48% PT in 2005 to 35% FT:65% PT in 2009
   c. high level of students placing in developmental sections and limited sections of basic arithmetic and pre-algebra courses offered
   d. limited number of full-time faculty specifically trained to teach developmental courses
   e. lack of financial support for Math Jam/summer bridge program
   f. the matriculation assessment process for math placement is perceived as needing changes by the math department
   g. the committee is concerned that the Math department does not consider the gender or ethnic breakdown of students in the department to be relevant issues.

III. The department addresses the recommendations noted by the validation team as follows
   a. The department will be submitting a HSI STEM grant proposal in July 2010 focusing on mathematics learning skills and transitioning students into transfer math, science, and technology programs. Again In priority #7 of the 2009 -10 Unit Plan, faculty in the division outlines goals to improve teaching learning-skills strategies that would benefit all students.
b. The number one priority in the 2010-11, as well as future years, Division Unit Plan, the Mathematics Department intends to that the college hire two(2) mathematics learning skills specialists to address a most critical component of our student population.

c. Invite department faculty to participate in the numerous, such as www.facultyfocus.com, district and statewide training seminars/webinars/workshops dealing with mathematics learning skills and technology in/out of the classroom such as VOD casts, POD casts, and clickers.

d. Replace the current mathematics placement process with a mathematics diagnostic/prescriptive instrument

e. Lower the current student-teacher ratio in developmental math courses, and supplement instruction in these courses with in/out of class mentor/coaches

f. Expand the use of comprehensive WEB enhanced software specifically developed as diagnostic/prescriptive.

h. Invite department faculty to mentor/partner with adjunct instructors to increase instructional cohesion.

i. Invite department faculty to meet a portion of their contractual office hours in the Math Lab.

j. In priorities #1, 7, 6, 9 and 10 of the 2009-10 Unit Plan, the division recognizes the need to include the college community when planning for student success. The Mathematics Department will plan at least one yearly workshop involving feeder high schools, middle schools and elementary schools focusing topics that can better prepare students for college mathematics and sciences.
The Role of the Validation Team

The validation team has been selected to include professionals who can assist the program by reviewing the self-study and plan of action, then making comments and suggestions that will lead to program improvement. In addition to reviewing the materials included in the written packet, team members are asked to visit the facility which houses the program, talk with instructors and students in the program, and request any further informational materials which would be helpful in preparing the executive summary.

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<th>Program Name: Process Plant Technology</th>
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<tr>
<td><strong>NAME</strong></td>
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<tr>
<td>David Humphreys</td>
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<tr>
<td>Joaquin Arias</td>
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<td>Judy Conn</td>
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<td>Sally Fasteau</td>
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<td>Eunice Krinsky</td>
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<td>Sandra Ramos</td>
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<td>Becky Yamada</td>
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Validation Team Report
Discipline: Mathematics
June 2010

**Major Findings: Strengths:**

- excellent list of short-term and long-term goals for program
- comprehensive program which meets degree, occupational, and transfer program requisites
- flexible schedule affording opportunities for students to attend, days, evenings, Saturdays, early morning (6:55 a.m.) classes, and hybrid classes
- new facilities, including state-of-the-art technology in the classrooms
- Math Lab support for students taking math classes
- updated course outlines with on-going efforts to assess and evaluate student learning outcomes.
- department’s effort to realign the elementary and intermediate algebra sequence of courses.
- introduction of a summer bridge through the Math Jam
- department’s recognition that developmental math skills need to be addressed differently in order to ensure student success in the math curriculum.
- the department is efficient in class size (41)

**Major Findings: Concerns:**

- department has a completion rate of 48.8% compared to the state average of 53%
- ratio of full-time to part-time faculty has decreased rapidly from 52% FT:48%PT in 2005 to 35% FT:65%PT in 2009
- high level of students placing in developmental sections and limited sections of basic arithmetic and pre-algebra courses offered
- limited number of full-time faculty specifically trained to teach developmental courses
- lack of support for Math Jam/summer bridge program
the matriculation assessment process for math placement is perceived as needing changes by
the math department
The committee is concerned that the Math department does not consider the gender or ethnic
disproportionate impact study.