Oklahoma City Community College

Program Review Self Study Year 2011

Division: Science and Mathematics

Program Name Mathematics 024

Prepared by: Professors Chris Oehrlein and Ernest Gobert

1. Program Curriculum

Program Name: Mathematics 024

Options:

I. Program Requirements

Minimum Required Hours 61

Major Courses		
Prefix & Number	Course Title	Credit Hours
Math 2104	CALCULUS AND ANALYTIC GEOMETRY I	4
Math 2214	CALCULUS AND ANALYTIC GEOMETRY II	4
Math 2314	CALCULUS AND ANALYTIC GEOMETRY III	4

General Education Courses		
Prefix & Number	Course Title	Credit Hours
ENGL 1113	ENGLISH COMPOSITION I	3
HIST 1483	U. S. HISTORY TO THE CIVIL WAR	3
(or) HIST 1493	U. S. HISTORY SINCE THE CIVIL WAR	3
BIO 1114	GENERAL BIOLOGY	4
(or) BIO ####	BIOLOGICAL SCIENCE 2000 LEVEL	3-4
ENGL 1213	ENGLISH COMPOSITION II	3
POLSC 1113	AMERICAN FEDERAL GOVERNMENT	3
PHYS 2014	ENGINEERING PHYSICS I	4
GEN ED	GEN ED ELECTIVE	12
HUM	HUMANITIES ELECTIVE (PHIL 1603 RECOMMENDED)	3
HUM	HUMANITIES ELECTIVE	3

Support Courses		
Prefix & Number	Course Title	Credit Hours
SUPP	GUIDED SUPPORT ELECTIVE	11

Life Skills Courses		
Prefix & Number	Course Title	Credit Hours
SCL 1001	SUCCESS IN COLLEGE AND LIFE	1

2. General description of review process and participants assisting with and conducting the review.

a. Program faculty assess annually student learning and program outcomes for their program. Every five years these assessments are evaluated globally. A program review document contains general college information from Advising, Recruitment and Admission and Institutional Effectiveness and program specific assessments of strengths and weakness of the reviewed program and program plans for the future.

b. A list of the student learning outcomes

Upon completion of the Calculus Sequence of the Mathematics Program, students
1) will demonstrate an understanding of the relationship between differential and integral calculus;
2) will accurately represent physical phenomena or engineering models using derivatives, integrals, and differential equations.

c. A list of program outcomes for the program

Upon completion of the Calculus Sequence of the Mathematics Program, students
1) will be prepared to succeed in junior level mathematics courses required of mathematics, science or engineering majors upon transfer to a baccalaureate granting institution;
2) will be prepared to succeed in sophomore level physics and engineering classes that require calculus as a prerequisite.

d. Well defined the criteria for measurement and how the criteria were used in the program.

1) Students in sophomore-level engineering courses with calculus and physics prerequisites will select or derive the correct differential or integral models for given physical situations or phenomena. 70% of the students will successfully select or derive the correct model.

2) Students will be given questions and computational problems on exams in Calculus II and Calculus III addressing to the concepts and skills relating differentiation to integration. In Calculus II the questions used the concepts and skills for solving separable first-order differential equations, and in Calculus III the questions used the concepts and skills about line integrals, conservative vector fields and potential functions, including solving exact first-order differential equations. 70% of students who took the prerequisite courses in the OCCC Calculus & Analytic Geometry sequence will successfully complete each question or computation.

3) 70% of students completing the calculus sequence at OCCC will earn grades of C or better in their immediately subsequent junior level mathematics courses at the University of Oklahoma and the University of Central Oklahoma.

4) Seventy percent of student completing the entire sequence of relevant calculus courses at OCCC with grades of C or higher will attain grades of C or better in physics and engineering courses with calculus prerequisites.

e. The evaluation, results and recommendations based on the criteria used.

1) Engineering Physics I: While 20 out of the 24 (83.3%) assessed students could successfully select a correct model and then make accurate computations using that model, only 14 of the 24 (58%) could successfully derive a correct model.

The expectations were met when students simply had to select and compute with a correct model, but were not met when students had to create or derive their own model. More emphasis needs to be made on teaching the concepts underlying the objective skills in addition to the symbolic and computational aspects of the objectives. While the approach to teaching and assessing the objectives needs to be broadened, OCCC's Calculus and Analytic Geometry sequence emphasizes the conceptual, geometric and applied aspects of the objectives much more than any other institution regionally (based on textbook selection and syllabi). With this information in mind, only students who have completed the prerequisite Calculus and Analytic Geometry courses at OCCC will be assessed to help determine if home-grown students display the same problems shown in this assessment.

2) Calculus II: All of the 42 assessed students (100%) answered the conceptual questions correctly. They all identified that the solution to the differential equation would involve an anti-derivative or integral. 38 of the 42 (90.4%) successfully calculated an anti-derivative recognizable from basic formulas. 22 of the 42 (52.4%) successfully calculated an anti-derivative that involved a substitution before applying a basic formula.

Calculus III: 21 of the 26 (80.8%) assessed students successfully identified the vector field as conservative and the appropriate theorem to apply to calculate the line integral. 19 of the 26 (73.1) correctly calculated the potential function and the value of the line integral.

In 4 of the 5 situations, the goal was met, but even where the goal was met, there was a decrease in the percentages that could successfully complete the calculation after identifying the correct concept to apply. As an assessment tool, the calculation was identified as correct or not. The types of errors were not analyzed and categorized. That information could still be identified by the instructor and used to improve the structure of the courses as it relates to homework, practice and feedback to students on the development of their skills and their study skills before testing. It is encouraging to see the improvement in using the anti-derivative/integration skills between Calculus II and Calculus III. It shows that through the sequence of courses, students are getting the opportunity to practice and understand the basic skills. That connection of the skills and concepts from one course in the sequence to the next needs to be emphasized better, especially

at the beginning of Calculus II. Beginning Calculus II with a review of the Chain Rule for differentiation and its application to integration by substitution (the very last objective presented and assessed in Calculus I) would establish the continuity of concepts and computational skills between Calculus I and Calculus II and would emphasize the importance of both objectives.

3) Insufficient official data received to evaluate this criteria. Informal conversations with undergraduate advisors at the University of Oklahoma indicate that this criteria is being met.

4) Calculus II: 36 out of 49 (73.5%) students assessed successfully completed Engineering Physics I after successfully completing Calculus II in the Fall 2009 semester.

Calculus III: 28 out of 37 (75.6%) students assessed successfully completed Engineering Physics II after successfully completing Calculus III in the Fall 2009 semester. Of those 37 there were 33 who also took a sophomore-level engineering course with a calculus and physics prerequisite. 21 of those 33 (63.6%) successfully completed the engineering course.

The criteria were met in 2 of the 3 situations. The data about the students taking multiple physics/engineering courses after completing Calculus III needs to be compared to students who take the sophomore-level engineering after, not concurrently with, Engineering Physics II to determine if there is a student workload/burnout issue to be addressed or if the decrease in success is related to content or content delivery in the calculus courses. The effects of Engineering Physics I on success in engineering courses needs to be included in the overall evaluation.

3. **Research and evaluation must be conducted on a continuing, systematic basis as an integral part of the program. All aspects of the program must be evaluated and the results used to improve services to students. There must be evidence that the program is reaching its stated student learning outcomes/program outcomes. The review should address each of the following areas. The program:**

    a. is central to the institution's mission:

The OCCC math program's course sequence of Precalculus, Trigonometry, and Calculus & Analytic Geometry I, II and III provide a strong foundation for students planning on transferring to four-year institutions to study mathematics in a pure or applied form or secondary eduction with an emphasis in mathematics or science. The courses also provide strong support for students in the computer sciences and pre-engineering - springboard programs into existing disciplines and for the development and application of future technologies.

b. meets stakeholder expectations:

OCCC programs provide our community with broad equitable access to a college education. OCCC students are prepared to succeed in college and are able to achieve their individual educational aspirations. OCCC graduates succeed at four-year institutions and/or in their careers. OCCC has a rich history of enriching our community both economically and socially through our educational and cultural programs.

c. produces graduates and former students who are successful on transferring:

There is insufficient official data to completely address this question. The most recent report with detailed transfer information concerns the 2006 transfer cohort at the University of Oklahoma. That report indicates that there were 110 OCCC students (who transferred in as juniors or seniors) in various programs at OU. Their average GPA at OU was 2.71. This compares favorably to the GPA of junior and senior UCO transfers to OU (22 students, 2.74 GPA) and to all other Oklahoma four year institution transfer students (65 students, 2.85 GPA). OU "native student" GPA was not reported. It should be noted that over 18% of transfer students at OU report OCCC as the "last institution attended."

d. contains instruction relevant to the curricular requirements at transfer institutions and in line with student interests and abilities

Programs of Study

OCCC offers two types of associate degree programs: transfer and technical/occupational. In addition, a number of certificates of mastery are offered in technical and occupational fields of study.

University Parallel/Transfer Programs

OCCC offers a broad range of transfer programs for students planning to continue on at a four-year college or university. Students may enroll in freshman and sophomore courses which lead to a baccalaureate degree in practically any field of study. Upon completion of specified degree requirements, the student is awarded an Associate in Arts or Associate in Science. These degrees require the completion of a minimum of 60 semester credit hours. Of the 60 semester credit hours, a minimum of 37 must satisfy the general education core requirements (see Degree Requirements). The remaining approved courses will be related to the student's major or courses which directly support that major.

Requirements and Articulation assures that the general education core (37 credit hours) of the Associate in Arts or Associate in Science degree at OCCC will apply directly toward the lower division general education requirements at any state university in Oklahoma.

Policy Statement on Undergraduate Degree Requirements and Articulation

In accordance with the Oklahoma State Regents for Higher Education Policy Statement on Undergraduate Degree Requirements and Articulation, a student who completes an Associate in Arts or an Associate in Science degree at OCCC “may transfer into a Bachelor of Arts or a Bachelor of Science degree program at any senior institution of the State System and be assured of completing his or her program in sequential fashion.”The Policy Statement on Undergraduate Degree

In addition, students are advised to secure the official catalog of the university to which they plan to transfer. Each university's official catalog provides pertinent information about admission policies and academic programs. That information is essential to the student's successful transfer to that university. Students should also consult a faculty advisor in their major at OCCC. With approval, the associate degree program may be modified to meet a student's needs depending on the intended transfer college or university.

Students are encouraged to visit the “Transfer Center” on the Oklahoma State Regents for Higher Education web site at http://www.okhighered.org/studentcenter/transfer-stdnts. This site will assist a student in determining which course or courses will transfer to another Oklahoma college or university.

Transfer guides showing course-by-course articulation between OCCC and a number of state universities are available in Office of Academic Advising. By using the appropriate transfer guide, the student can be assured that courses in the student's major will transfer directly toward the bachelor's degree.

OCCC has established specific curriculum patterns for transfer programs leading to the Associate in Arts (A.A.) or Associate in Science (A.S.) degrees. The curriculum patterns listed below are presented in the next section of the Catalog.

e. Have systems to evaluate courses and faculty by students, administrators, and departmental personnel

Faculty Performance Review and Evaluation

Faculty will be evaluated on the basis of the established standards of performance and objectives established in the person's contract and any subsequent memorandums of agreement established for the position/person. Faculty are defined as employees who primarily perform teaching and instruction-related duties and who are employed on the basis of a written contract setting forth the duties to be performed and the compensation to be paid. The performance appraisal for each faculty member will be conducted by the Division Dean or Director as appropriate. In preparation for the review, the employee will provide relevant information to the Division Dean or Director as appropriate at least two working days prior to the evaluation conference. The results of the subsequent performance appraisal conference will be documented on a rating sheet signed by both the employee and the Division Dean and/or Director as appropriate.

Course and Faculty Evaluation

The Student Input on Instruction form is a means of gathering student perceptions of instruction at the college. The results are intended for use by you and your dean in identifying ways to improve instruction. A copy of the form is in the appendix of this document. The forms and supportive instructions will be distributed for you to administer during the 8th, 9th, or 10th week of 16-week courses or the 5th or 6th week of eight-week courses. Prior to administering the instrument, you should:

1. Plan class time to help ensure that time is available for completing the forms.

2. Where desirable, prepare up to three (3) questions, which are unique to the course or section for inclusion as the optional questions on the form. You should have multiple copies of these questions printed for use by the students.

3. Select a student to be responsible for administering and returning the forms and brief him or her about the process. It is best to keep the forms and instructions in your possession until the day you plan to administer them. Your cooperation in helping to ensure that the Student Input on Instruction forms are completed in a timely manner will go a long way to provide useful student input concerning your instructional methods.

f. Is staffed, administered, and supplied to provide for the development of competent students in all areas including citizenship and social conscience

Service-Learning

Incorporating service-learning as a part of a course's curriculum is easy to do and can enhance students' ability to understand and apply course material. Service-learning can generally be used as a part of any course's learning objectives and tailored to desired learning outcomes. The Student Life Service-Learning Center partners with over 100 community agencies, so there is something for every course and interest area. Office of Student Life coordinates student involvement in service learning.

g. Has current, appropriate, useful, and sufficiently comprehensive instructional media and materials.

The mathematics program currently has 16 full time and 50-60 part-time faculty members. There are 4 developmental mathematics lab instructors, plus 4 full-time and about 20 part-time staff members. Enrollment is increasing. The primary curriculum change has been redesign for the developmental mathematics courses and mathematical systems. The developmental courses should not affect needs for library resources and the needs of the mathematical systems courses have been addressed. The contemporary math course continues to use the math pathfinder developed by the librarians to guide student research. Students also use Math textbooks on Reserve, find articles and do research for papers. Some library computers also have appropriate plug-ins for computer mediated math reading. Faculty uses the collection for professional development.

Call numbers in the following ranges support the Mathematics program:

QA 1-70, 90-939 Mathematics, including mathematical logic, computer science, elementary math & arithmetic, algebra, probabilities, mathematical statistics, analysis, geometry, and analytic mechanics.

HF 5691-5696 Business math

The circulating collection receives a lot of use, and will continue to be updated. Old textbooks need to weeded. Because of heavy demand faculty have asked that multiple copies of texts on Reserve be purchased.

The reference collection has been enlarged and updated with addition of math handbooks, dictionaries and encyclopedias, and various biographies of mathematicians. The section is in excellent shape.

AV materials appear to be meeting faculty and student needs. The math review series available for checkouts are quite popular with students.

The Library subscribes to the following periodicals in this area:

College Mathematics Journal
PRIMUS: Problems, Resources and Issues in Mathematics
Science News
Scientific American
UMAP Journal
These support the curriculum well. However, the most amazing change in the Library support for the Mathematics program, so far used sparingly, has occurred in the area of access to periodical articles through the online article databases.

The Library has dramatically improved the resources in makes available to the College Community. From the Library's home page, students can use the catalog of books and videos, search a variety of article databases, link to recommended web sites, and make online requests. During 2005-2010 the Library web pages were extensively redesigned, adding more resources and information. With these databases and the Internet, students have wonderful access to current information.

For example the Library added several major resources for periodical articles: EbscoHost, a comprehensive online article database with several thousand full-text journals; another with full text articles from 500 newspapers around the U.S.; and PROQUEST, made up of 5 different historical newspaper databases (Christian Science Monitor, Los Angeles Times, New York Times, Wall Street Journal and Washington Post).

Students who have access to computers off-campus can easily do online research not possible a few years ago. The Library provides user authentication so that any member of the OKC College Community can use all of the Library's online resources, even from a computer off-campus. The Library has 76 public computers for student use for research, and more than half of them are set up with DVD players and headphones.

On the Library web page a student can find interactive modules on how to use the library and how to do basic research. The modules are useful to students both on- and off-campus. Since the previous program review, the Library has employed an Electronic Services/Reference Librarian to help strengthen student awareness of and skill in using resources. Several online video tutorials have been created in addition to the online Research Papers Help module.

In sum, Library resources supporting the Mathematics program are adequate and will continue to be updated.

h. Provides adequate resources and adequate and appropriate faculty whose qualifications (including educational background, related experience, and service contributions related to the program) support the objectives and curriculum of the program.

Faculty who teach courses in the Calculus Sequence all have earned at least Master's degrees in mathematics or a related field with 18 graduate hours in mathematics or mathematical sciences. The full-time faculty and their qualifications are listed below.

Marsha Austin has earned a Bachelor of Science in Mathematics from Oklahoma State University and a Master of Science in Mathematics from Oklahoma State University. She has 29 years teaching experience.

Daniel Benton has earned a Bachelor's degree in Finance and a Master's degree in Mathematics from the University of Oklahoma. He serves on many college task forces related to campus and classroom technology.

Lisa Buckelew has earned a Bachelor's degree in Mathematics and a Master's degree in Mathematics, both from the University of Oklahoma. She supervises the Oklahoma City metro area MathCounts competition. She has also been teaching a paired College Algebra - English Composition I section for the past three years.

Paul Buckelew has earned a Bachelor's degree in Mathematics from The University of Oklahoma and a Master's degree in Mathematics from The University of Oklahoma. He has served as OCCC Faculty Association Chair and is an inaugural member of the college's Cooperative Learning initiative.

Betty Coleman has earned a Bachelor's degree in Mathematics from Langston University and a Master's degree in Mathematics from Michigan University. She has been employed at the college for 33 years.

Dale Duke has earned a Bachelor's degree in Mathematics and Chemistry from Southern Nazarene University and a Master's degree in Secondary Education from the University of Central Oklahoma. She brings expertise in the design and delivery of online mathematics courses. She is also the Math Program Coordinator responsible for adjunct faculty teaching assignments.

Ernest Gobert has a B.S. in Applied Mathematics from U.S.A.O and an M.S. in Applied Mathematics from the University of Oklahoma with emphasis in Numerical Analysis. He has 15 years of teaching experience at as a math instructor. He brings strong computer skills in both hardware and software to the classroom along with knowledge in implementing/writing computer programs for the numerical analysis of applied math problems which he has applied to the continual improvement of the Calculus for Business, Life and Social Sciences sequence.

Ken Harrelson has an Associate's degree in Pre-engineering from Amarillo College,

a Bachelor's degree in Mathematics from West Texas State University and a Master's degree in Applied Mathematics from Oklahoma State University. He oversees the computer-delivery components of the College Prep Math courses and the course web sites for online sections of College Algebra, Precalculus and Trigonometry.

Linda Knox has earned a Bachelor's degree in Mathematics from University of Science and Arts of Oklahoma and a Master's of Education degree in Community College Teaching of Mathematics from the University of Central Oklahoma. Linda is one of the Developmental Mathematics Coordinators. She is a frequent presenter at conferences on mathematics education and the incorporation of technology into mathematics classrooms.

Gail Malmstrom has earned a Bachelor's degree in Mathematics from Houghton College and a Master's degree in Applied Mathematics from the University of Colorado, Boulder. She serves as the Conference Chair for the Oklahoma Council of Teacher's of Mathematics.

Jay Malmstrom has earned a Bachelor's degree in Mathematics from California State University, Fullerton and a Master's degree in Applied Mathematics from the University of Colorado, Boulder. As a Navy Officer, he taught Mathematics at the United States Naval Academy and was a Research Mathematician at the National Security Agency. He serves on Mathematical Association of America's Committee on Program Assessment and is a frequent presenter and panel leader at MAA national conferences.

Janet Mitchell has earned Bachelor's and a Master's degrees in Mathematics with Education from the University of Oklahoma. Janet is a specialist in preparing future teachers in mathematics and a frequent presenter at National Council of Teacher of Mathematics conferences. She also serves as one of the Developmental Mathematics Coordinators.

Charles Nunley has earned Bachelor's and Master's degrees in Mathematics from the University of Oklahoma. He is the coordinator for the Calculus and Analytic Geometry sequence which serves all of the mathematics, computer science, physics and pre-engineering majors.

Chris Oehrlein has earned a Bachelor's degree in Mathematics from Texas Christian University and a Master's degree in Mathematics from Rice University. He is also certified as a faculty development trainer in Writing Across the Curriculum, Mathematics Learning Styles and Mathematics Study Skills. He is currently a Project Writer for the NSF-sponsored Dimensions Program, the president of the Oklahoma Mathematics Association of Two-Year Colleges, and serves on the Nominating Committee and the Committee on Placement and Assessment for the American Mathematical Association of Two-Year Colleges. He is also a frequent presenter at national and regional conferences on mathematics, developmental education and student success initiatives.

Sherry Ray has a Bachelor's degree in Mathematics from Southwestern Oklahoma State University and a Master's degree from the University at Oklahoma. She has 18 years of teaching experience at the college level.

Mike Turegun has a Bachelor's degree in Engineering from the Technical University of Istanbul and Master's degrees in Geophysics and Mathematics, both from the University of Tulsa. He is currently completing a doctoral degree from the University of Oklahoma with an emphasis on undergraduate statistics education. He also serves the College Board as a reader for the Advanced Placement Statistics exams.

4. **Evidence should be presented that shows a systematic review of the curriculum is conducted regularly. This review should indicate how the general education competencies are being met:**

   General Education Assessment Plan

Objective:

To assess and recommend actions for the general education component of Oklahoma City Community College's curriculum.

Strategy:

The General Education Committee will create six interdisciplinary teams with embers from multiple divisions. Each team will consist of five members with two members specifically teaching in one of the General Education Core Areas. Also, at least one team member will be a representative of the General Education Committee.

Twice a year these teams will evaluate one hundred artifacts from students having attained at least 36 hours of General Education Courses from OCCC. During each Spring Semester, the reports from each team will be shared at the meeting of the whole General Education Committee and dispersed to faculty within each division. Specifically, during the Fall Semester, each team in charge of a specific Student Learning Outcome area will make curriculum recommendations to the General Education Committee. Reports, recommendations, and actions created from the General Education Assessment Process will be stored on the General Education Committee Website. Faculty members on each team will be compensated each semester.

Method:

Developed rubrics will provide common criteria for assessing “artifacts” gathered from various courses. Artifacts may include but are not limited to recorded performances, PowerPoint Presentations, essays, lab reports, research projects, service-learning projects, or any assignment preexisting in a faculty's course. However, the artifacts should adhere to the specific objectives of the Student Learning Outcomes established by the General Education component of OCCC's curriculum.

Nevertheless, the underlying principle of this method is (1) to reduce the intrusive nature of assessment within faculty courses, (2) to create a real environment of student performances within a classroom setting instead of a contrived environment of a forced examination (i.e. CAAP exams not counting for a classroom grade), and (3) to collect

Data Collection:

The Office of Institutional Effectiveness will identify each semester students completing at least 36 credit hours in General Education Courses. From this list, they will identify a random sampling of students enrolled in courses, which faculty have included “artifacts” relating to the Student Learning Outcomes measured each semester.

For example, if an outcome in Math is measured, then the following courses beyond a Math Prefix could also be used: Introduction to Logic, Business Statistics, Behavioral Statistics, Chemistry, Physics, Accounting, Physical Science, or other General Education Courses involving Math and including the objectives for the Math Student Learning Outcome. Likewise, data collection could be attained from an outcome in Writing from any course involving writing, including a scientific lab report, as long as it adheres to the objectives of the Writing Student Learning Outcome for the General Education curriculum.

The premise behind this kind of data collection (1) allows for an interdisciplinary approach to the General Education curriculum; (2) creates a shared vision of faculty collaboration beyond the microcosm of specific divisions; (3) allows for a more accurate depiction of student learning as they progress from one General Education Course to the next; and (4) creates a shared approach to improve student learning and success by reiterating General Education Skills from multiple courses.

The General Education Core

General Education at Oklahoma City Community College is an integral component of each student's experience. Every student receiving an Associate Degree (AAS, AA, or AS) must complete at least one course from each of the following areas, indicating a general understanding of that area.

I. **Human Heritage, Culture, Values, and Beliefs**

Students will demonstrate an understanding of the ideas, values, and beliefs that have shaped global communities. Specifically, students should be able to

Demonstrate understanding of basic world geography; Demonstrate familiarity with major cultural issues of selected global communities; Demonstrate knowledge of significant historical events and figures of selected global communities; and Demonstrate an understanding of ethical concerns of selected global communities.

II. Communication and Symbols

A. Students will demonstrate effective writing and public speaking skills.

For writing, students should be able to

Generate a clear, specific, and arguable thesis or dominant idea; Formulate evidence and examples to support the topic idea; Construct a logical pattern of paragraph development; and Demonstrate consistent use of correct and appropriate spelling, grammar, and word choice.

For public speaking skills, students should be able to

Demonstrate the effective use of an introduction, body, and conclusion of a formal speech; Demonstrate an audience-centered purpose that adapts to the audience, occasion, and time limit of the speech; Deliver the speech with effective eye contact relative to the use of presentational aids (when applicable) and the audience; Vary the tone of voice appropriate to the content of the speech and context of the audience; and Demonstrate appropriate attire, gestures, good posture, and meaningful body movement.

III. Social, Political, and Economic Institutions

Students will demonstrate an understanding of the function of major social institutions. Specifically, students should be able to

Analyze how political systems impact society; Analyze how economic systems impact society; Analyze how religion serves to shape the norms of a society; Analyze how education interacts with cultural values and norms; and Analyze how shifts in social institutions impact the family.

IV. Relationships in Nature and Science

Students will demonstrate critical thinking by using scientific methodology. Specifically, students should be able to

Analyze a set of data or qualitative observations using previously learned tools; Draw reasoned conclusions based on the results of the analysis; and Support conclusions logically and communicate them effectively.

Program Response to General Education Assessment Data

General Education requirements represent just over sixty percent of each Associate of Science or Associate of Arts degree, making the careful assessment of these broad competencies OCCC considers essential for all graduates very important. Provide Evidence that shows a systematic review of the curriculum is conducted regularly. This review should indicate how the general education competencies are being met.

The mathematics faculty recognize the importance of creating well-rounded students who are able to apply their mathematical knowledge in a world centered around data, technology and communication. While taking the courses in the Calculus Sequence, students are required to do more than just memorize and re-create symbolic and numerical calculations. They must effectively communicate what tools they are using and what their solutions mean in multiple modalities - symbolically, in writing, geometrically, and in the context of physical applications and computer-modeled simulations. Through this variety of investigation activities and assessment tools, students must use and develop many of the general education skills valued by the college.

5. Provide a summary of how concerns and recommendations identified in the last program review were addressed.

Concerns of the last review included the need for more full-time faculty and the desire for courses outside the Calculus Sequence that would address other needs of math and mathematical sciences majors.

While new full-time faculty members have been hired, over the past five years, the size of the department has not increased, and so has not kept up with the overall increase in the student body of the college and the numbers of students taking all levels and types of mathematics courses.

Other courses were considered but not developed. OCCC does not have enough math majors to support courses such as Discrete Mathematics, Modern Geometry, etc., and other campus departments were not supportive of new courses as requirements or support electives for their majors. For mathematics or mathematical sciences majors, these other areas are offered as special topics, reading courses.

6. Describe the strengths of the program identified through this review.

While the official number of majors has leveled off after a few years of increase, enrollment in the Calculus Sequence continues to grow, primarily as a support mechanism for the Pre-Engineering program. Many of the Pre-Engineering students will decide to pursue math as a second major.

More of the faculty, both full-time and adjunct, are teaching in the Calculus

sequence. This is good for students. They get to see, hear and experience multiple perspectives on the same objectives, skills and concepts.

Communication between the mathematics faculty and the faculty leading and teaching the physics and pre-engineering programs has improved. Deliberate attempts to coordinate course sequences and schedules give students a better chance of completing their programs in a reasonable number of semesters, and deliberate focus on shared objectives and concepts reinforces the importance of those concepts and their applications. This should ultimately create better problem-solvers as our students have many perspectives and skills upon which to draw.

7. **Describe the concerns regarding the program that have been identified through this review**.

Maintaining the number and diversity of faculty teaching in the Calculus sequence will be difficult if college enrollment continues to increase and more faculty are needed to teach College Prep Math and College Algebra.

Our students still need to become better problem-solvers. Through the coursework and direction of their instructors, the students learn and demonstrate ability at a high level on computational skills and algorithmic problem solving.

8. **Develop a list of recommendations for action that addresses each of the identified concerns and identify planned actions to implement recommendations.**

The math department needs more full-time faculty. To confront the growing numbers of new students placing into College Prep Math, taking College Algebra to fulfill general education requirements, and taking Calculus for Business, Life and Social Sciences because of perceived changes at local four-year institutions, the mathematics department will have neither enough nor a large enough diversity of instructors involved in the Calculus Sequence for mathematics and mathematical sciences majors.

Addressing higher-order problem-solving skills and relating those mathematical skills to related disciplines needs to start before the Calculus Sequence. So too does the assessment. The courses that are prerequisite to the Calculus Sequence need to be evaluated and the students coming from them into calculus need to be assessed with regards to the necessary skills and the seeds of problem-solving.

II. Institutional Requirements

1. Provide factual and accurate documentation which demonstrates acceptable standards of ethics in recruiting and advertising activities.

All materials provided to students are thoroughly reviewed by appropriate personnel to ensure they are factual and accurate. In addition, appropriate personnel review all recruiting and advertising activities to ensure they meet acceptable standards of ethics. Prospective students may access information about the college and its programs through the Office of Recruitment and Admissions.

Services provided by this office include campus tours, community and high school outreach, information sessions, scholarship programs and corporate recruiting. College information is provided to students through traditional means such as class schedules, catalogs, student handbooks, Recruiters Manual, and new student orientation as well as through the College website.

2. Provide recruitment and admission policies and practices reflecting that the program is available to qualified applicants and that qualified applicants will be admitted regardless of sex, race, ethnic background, religious preference, disability or any disadvantage.

Recruitment practices and activities are planned and reviewed by appropriate personnel to ensure the institution's vision, mission, and ENDS are met. Every effort is made to ensure that all qualified prospective students are contacted and provided with opportunities to be informed about College programs, services and courses and are provided with the opportunity to apply for admission to the College.

Students entering Oklahoma City Community College as a Regular Degree Seeking Student will meet the following admissions requirements:

- graduated from high school or earned a GED;
- completed the ACT, SAT or a similar acceptable battery of tests; and
- completed all high school curricular requirements.

Students who do not meet the above criteria may be admitted under one of seven Special Admission Categories outlined in the Catalog. All students who meet the above requirements or who fall into one of the special admissions categories are admitted without regard to sex, race, ethnic background, disability or disadvantage.

3. **Provide documentation that an organized, coordinated program of guidance and counseling exists. The program should foster maximum development of individual potential by providing institution-wide assistance in the choices, decisions, and adjustments that individuals must make to move through a program.**

   Faculty from each program work very closely with the Student Development Center staff. Each student is encouraged to have a counselor from Student Development as well as a faculty advisor.

   Degree sheets are available in the Student Development Center as well as in faculty advisors' offices. Students may also access degree requirements and complete an up-to-date degree audit online. Faculty advisors work closely with Student Development Counselors to minimize the number of hours unable to be counted when a student transfers to a four-year institution.

   The general philosophy and objectives of the Student Development Center include informational, relational and conceptual processing of educational planning and student goal achievement, including degree completion, articulation or personal development and apply to all students.

   The functions of Student Development are stated in the College's Policies and Procedures Manuals and in the Catalog for the benefit of all students, faculty, and staff. Student Development objectives are also outlined in the above mentioned documents.

   Counselors follow guidelines listed below in working with students. After admission to the College, a student is evaluated for placement. After the evaluation is complete, the student meets with a counselor to determine enrollment. Course selections are based on test scores, anticipated program and required courses, workload, possible transfer and past academic history. If the student expresses indecision over goals, especially for career or program choice, they explore them with a counselor in Student Development.

   When a student indicates a desire to pursue a specific program, they are referred to the appropriate faculty advisor or program director. An individual strategy is built for each student, designating courses to be enrolled in for each semester.

Counselors in the office of Student Development are available to discuss career objectives and degree programs with each student. The staff of Student Development assists all students with educational planning, career decisions, and occupational choices. Further assistance is available in conjunction with the Discover Program and the other resources of the Career Counselor.

Academic Advisement (faculty handbook)

In the course of interacting with students, it is the responsibility of faculty members to serve as academic advisors. In addition, faculty give advice on a broad range of topics and issues. The kinds of advice offered by faculty can be categorized in the following way.*

* It is important to underscore that this listing is intended to be suggestive rather than exhaustive or prescriptive.

Program Requirements

It is important for students to meet with an advisement professional to establish a Student Academic Plan (SAP). Returning students who are familiar with their degree requirements and those not seeking a degree or certificate may self advise.

Students are also encouraged to work concurrently with their faculty advisor in the academic discipline of their degree choice. A faculty advisor can help ensure that major specific educational objectives are met in an efficient, orderly fashion. If you have questions on course selection, entry-level skills required or general academic information contact Office of Academic Advising. With respect to program requirements, faculty advisement may address such things as degree planning (timing and sequencing of courses), identifying the appropriate catalog (degree plan to follow), selecting support electives, and meeting special requirements for a program or student (e.g., clinical performance, immunization, CPR).

Transfer Concerns

Relative to transfer concerns, faculty advisement may include such things as providing information on programs at area transfer institutions, information on out of state/state institutions, and transfer procedures to those institutions. It may also include evaluation of course content of major courses being transferred in for a particular major.

Career Information

Providing career information may include information about employment opportunities with various levels of education and responding to questions regarding how to select a path to follow within the field.

Referral

Referral may be done when faculty advice is sought on such matters as financial aid, transportation problems, problems with transcripts, formal degree checks, personal problems requiring counseling, graduation procedures, or any issue that the faculty member determines can be best served by others.

4. Provide documentation that reflects accurate and complete cumulative records of educational accomplishment including:

a. The number of majors (head count and FTE) in the instructional program during each of the last three years and projections for the next two years.

Head count	Credit hours	
Fall 2007	59	482
Fall 2008	71	647
Fall 2009	86	793
Fall 2010 (projected)	73	641
Fall 2011 (projected)	75	660

b. the size of specialized (program major) classes, if any, identified as integral elements in the program during the last three years.

Average class size:

	Fall 2008	Fall 2009	Fall 2010
Math 2104	24	27	30
Math 2214	20	25	25
Math 2314	17	17	27

c. Instructional cost, including efficiencies and improved learner outcomes achieved through the use of any technology.

Oklahoma City Community College offers online courses (computer based/ Internet) which allow students the freedom from attending regularly scheduled course meeting times while still earning college credit. Online courses are similar to traditional, on campus courses in that they have a regular class schedule, assignment due dates, and the expectation of student interaction. OCCC has committed resources for the creation of specialized resources for online students with the goal of increasing student success. These resources include a customized section of the OCCC website to assist them as they progress in their academic studies via distance and an orientation to the College's Learning Management System. We are also in the early stages of implementing virtual tutoring in the Math and Communication labs to further customize and personalize online students' education. The cost of these initiatives and efforts totals $17, 000.00. OCCC has also dedicated a specialized team of student technology support to provide assistance to students seven days a week as they work within the learning management team which costs the College $120,034.00.

As of August, 2010, all classrooms on campus requested to be multimedia classrooms will be appropriately equipped with computers and projectors for instructors to incorporate into their courses. The cost incurred with this multi-year effort is $1.22 Million. Instructors are beginning to utilize classroom response systems, slates, and SMARTBoards as part of their efforts to continue to increase student engagement with course content. The classroom technologies are part of a new effort on campus so the cost thus far has only been $15,000.00. The Center for Learning and Teaching offers multiple learning opportunities for faculty related to strategies for incorporating technology into instruction effectively as well as the use of the College's LMS, ANGEL. Faculty members are also provided multiple opportunities to increase their learning through participation in webinars on identified topics relevant to faculty's professional development goals and objectives. Data will be collected in the upcoming months on the impact of these efforts to assist with the assessment of the expenditure of funds and direct further efforts.

d. The number of FTE faculty in specialized (program major) courses within the curriculum

FY 2008:
MATH-2104: FTE faculty = 1.3
MATH-2214: FTE faculty = 0.9
MATH-2314: FTE faculty = 0.7

FY 2009:
MATH-2104: FTE faculty = 1.5
MATH-2214: FTE faculty = 0.9
MATH-2314: FTE faculty = 0.8

FY 2010:
MATH-2104: FTE faculty = 1.3
MATH-2214: FTE faculty = 1.2
MATH-2314: FTE faculty = 0.8

e. Projected job market for graduates in occupational programs during the next two years.

NA

f. The success of transfer students based on GPA comparisons.

FY 2008:
MATH-2104: FTE faculty = 1.3
MATH-2214: FTE faculty = 0.9
MATH-2314: FTE faculty = 0.7

FY 2009:
MATH-2104: FTE faculty = 1.5
MATH-2214: FTE faculty = 0.9
MATH-2314: FTE faculty = 0.8

FY 2010:
MATH-2104: FTE faculty = 1.3
MATH-2214: FTE faculty = 1.2
MATH-2314: FTE faculty = 0.8

NA

5. Provide documentation that a process exists to insure that cumulative records of educational accomplishment are securely and permanently maintained for every student, and transcripts are issued upon student request.

The Registrar's Office establishes an official record for each student admitted to the college. Cumulative academic records are maintained and archived in compliance with all federal and state requirements and in accordance with American Association of Collegiate Registrars and Admissions Officers (AACRAO) recommendations.

The College complies with the Federal Rights to Privacy Act of 1974, as amended, regarding record integrity, security, access, and the release of Directory Information. Transcripts are issued directly to the student upon request and at no charge.

6. **Provide evidence that a formalized and effective process to address student complaints is in place and available to students.**

   The Student Handbook describes the student grievance procedure. The Student Handbook is published annually so that changes can be made to stay current with all state and federal policies and rules.

   Also students may at any time submit questions or complaints in boxes located across campus. The Office of the Vice President for Enrollment and Student Services collects the input from these boxes and addresses the student's question or complaint. The results are given to the student, reviewed by The Leadership Council, published on a public bulletin board in the Main Building of campus, and published in the Student Services Annual Report.

7. **Provide institutional recommendations as the result of the program review and planned actions to implement recommendations.**

The Mathematics Department has grown tremendously in the total number of enrollments and credit hours since the last review without adding full-time faculty. In the past the Institution has stated that it at least 50% of sections be taught by full-time faculty. We are currently not achieving this goal. Two to three new full-time positions need to be added. This will be a priority of the Science and Mathematics division but is dependent upon funding.

The need to emphasize higher order problem solving/critical thinking skills in courses prior to the calculus sequence will be strongly supported at the Department and Division level. This need has been noted as a result of both Program and General Education assessment activities.