



Skyline College Annual Program Planning Self-Study

*Note: To complete this form, **SAVE** it on your computer, then send to your Division Dean/VPI as an **ATTACHMENT on an e-mail message.***

Program Title: **Date Submitted:**

Key Findings: The mathematics program provides students with multiple pathways to meet their degree requirements, the analytic geometry based calculus sequence for STEM majors, the applied calculus sequence for business majors, the pathway to statistics for non-STEM majors, and basic skills courses. Although the efficiency (faculty load) of the program is very high and the faculty work closely with many learning communities to help students succeed, additional resources are required to facilitate identification and implementation of additional methods for increasing student success.

1. Planning Group Participants (include PT & FT faculty, staff, students, stakeholders)

List Names and Positions:

FT Faculty: Daisy Araica, Younga Choi, Stephen Fredricks, Jon Freedman, David Hasson, Richard Hough, Evan Leach, Cindy Moss, Tadashi Tsuchida, Phillip Williams, Soodi Zamani
PT Faculty: Ann Ban, Sue Broxholm, Arash Farahmand, Eugene Garcia, Hong Guo, Zhanna Kotsishevskaya, Ray Hoi Sun Kuan, William Kwok, Jude Loeffler, Abdel Maoujoudi, Mike Maxwell, Eric Miranda, Kayvan Momeni, Sean Nguyen, Richard Piserchio, Tom Reuterdaahl, Li Wang, Miranda Wang

2. Contact Person (include e-mail and telephone):

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3. Program Information

A. Program Personnel

Identify the number of personnel (administrators, faculty, classified, volunteers, and student workers in the program:

FT Faculty: PT Faculty:

B. Program Mission and goals

State the goals/focus of the program and how the program contributes to the mission and priorities of the College and the District. Address how the program meets the current year's strategic priorities. (200 word limit recommended.)

Courses in mathematics provide a foundation for quantitative analysis, discovery, life-long learning and reasoning. In addition, the program contributes to the College's mission by providing

- basic skills preparation,
- courses that satisfy degree requirements,
- skills necessary to complete a number of occupational programs,
- transfer requirements,
- coursework that fosters student growth and achievement, and
- an atmosphere that celebrates cultural diversity, particularly through the MESA center which is strongly supported by the math program.

The program strives to make mathematics a bridge rather than a barrier to success. The department continues to work towards increasing success and retention rates; striving to enable more students to reach their academic goals.

4. Program/Service Area Student Learning Outcomes and Program Data

A. Summarize recent course (for instruction, including student service courses) or program (for student services and every three years, CTE programs) SLO assessment, identify trends and discuss areas in need of improvement. Please attach summary TracDat reports with assessment analysis reports and analysis for SLOs evaluated during the last two years (prior to submission deadline of April 1st). (200 word limit is recommended.)

Course	Results	Action Plan
MATH 110	100% of students correctly identified the population for which a linear model is appropriate. 74% of students correctly justified their choice. 42% of students found an appropriate linear model.	Assessment tools will be modified to better reflect the learning outcomes of the course. In addition, assessment emphasis will shift from content to grit.
MATH 111	97% of students correctly identified the appropriate model. 52% of students justified their choice correctly. 34% of students found and appropriate model.	Assessment tools will be modified to better reflect the learning outcomes of the course. In addition, assessment emphasis will shift from content to grit.
MATH 112	95% of students correctly identified the appropriate model. 73% of students correctly justified their choice. 59% of students correctly identified an appropriate model.	Assessment tools will be modified to better reflect the learning outcomes of the course. In addition, assessment emphasis will shift from content to grit.
MATH 115	86%(18 of 21) of students averaged at least a 3 on the 4 pt. rubric for proofs. (07/13)	Assessment tools will be modified to better reflect the learning outcomes of the course. In addition, assessment emphasis will shift from content to grit. (04/14)

Course	Results	Action Plan
MATH 120	88% of students correctly identified the population for which a linear model is appropriate. 73% of students correctly justified their choice. 41% of students found an appropriate linear model. 91% of students correctly identified the population for which an exponential model is appropriate. 42% of students correctly justified their choice. 40% of students found an appropriate exponential model.	Assessment tools will be modified to better reflect the learning outcomes of the course. In addition, assessment emphasis will shift from content to grit.
MATH 122	66% of students correctly identified the population for which a linear model is appropriate. 45% of students correctly justified their choice. 0% of students found an appropriate linear model. 21% of students correctly identified the population for which an exponential model is appropriate. 11% of students correctly justified their choice. 11% of students found an appropriate exponential model.	Assessment tools will be modified to better reflect the learning outcomes of the course. In addition, assessment emphasis will shift from content to grit.
MATH 123	88% of students correctly identified the population for which a linear model is appropriate. 73% of students correctly justified their choice. 41% of students found an appropriate linear model. 91% of students correctly identified the population for which an exponential model is appropriate. 42% of students correctly justified their choice. 40% of students found an appropriate exponential model.	Assessment tools will be modified to better reflect the learning outcomes of the course. In addition, assessment emphasis will shift from content to grit.
MATH 222	70% of students correctly created a linear model for the appropriate population. 61% of students correctly created an exponential model for the appropriate population.	Assessment tools will be modified to better reflect the learning outcomes of the course. In addition, assessment emphasis will shift from content to grit.

Revision of Student Learning Outcomes The most recent review of the student learning outcome assessment results indicated that the course level student learning outcomes should be revised to better reflect the goals of each course, better assessment tools should be developed for the student learning outcomes, and that the communication of the student learning outcomes should be improved.

To this end, a new SLO has been implemented at the program level and at the course level for all courses: *Grit*. Students must be challenged to the point where they encounter failure and frustration so that they may learn to step back, reassess and try again. Our goal will be to improve student performance by focusing on encouraging perseverance rather than reorganizing or adjusting presentation of content.

B. Analyze evidence of Program performance. Review and analyze productivity, student characteristics and outcomes. (200 word limit recommended.)

Success and Retention Rates Success and retention rates have remained flat over the past five years. Over this interval, retention in mathematics courses has been approximately 78% and success has been approximately 58%. Content continues to be refined, as well as new and creative methods of presentation. The department has agreed that a new emphasis on fostering perseverance and resilience, called *Grit*, should be examined. Teaching students to be tenacious in pursuit of mathematics mastery will hopefully produce higher retention and success rates.

Underperforming Groups The data from the PRIE has indicated that success and retention rates for African-American and Hispanic students are lower than those of Asian and White students. Learning communities have been established to address the imbalance. In addition, a request for data will be made to examine the success and retention rates of STEM courses versus non-STEM courses and the proportion of African-American and Hispanic students in STEM courses versus non-STEM courses. The department is interested in encouraging underrepresented groups in pursuing STEM courses and majors.

The Student Success Scorecard Skyline College is already ahead of the state on the Student Success Scorecard in mathematics remediation; 33.6% of Skyline College students who started in 2007-2008 below transfer level in mathematics completed a college-level mathematics course versus 30.6% statewide. Of particular note, 34.6% of African-American students who started in 2007-2008 below transfer level in mathematics completed a college-level mathematics course versus 17.4% statewide.

C. Explain how other information may impact Program (examples are business and employment needs, new technology, new transfer requirements, etc.) (200 word limit is recommended.)

Biotech Bay and Silicon Valley Due to the proximity of Skyline College to important hubs of technological innovation, the mathematics department is concerned that we are not encouraging enough students to pursue STEM courses, majors and careers. This is especially noticeable with regards to groups that are traditionally underrepresented in technological careers.

Integration of Technological Instruction To better prepare students for majors and careers in technological fields, the department will increase integration of common mathematical tools in its courses. Students leaving Skyline College with STEM majors should have an introduction to commonly used tools such as MATLAB and Mathematica.

5. Curricular Offerings

A. Program Curriculum and Courses. If your program does not offer curriculum, please state "N/A".

Respond to the following:

- What new courses (excluding Individual Selected Topics [665] topics and Experimental [680/880] courses) have you added to your program curriculum in the past academic year? List by Department, Course Number and Course Title.
- Note that you've added new courses to the department's three-year calendar of assessment and requested that they be added to TracDat.
- Note that you've done the following for new courses on TracDat:
 - Updated SLOs?
 - Mapped course-level SLOs to PSLOs (including relevant interdisciplinary degrees) and ISLOs?
 - Uploaded assessment method(s) (need not be specific)?

Number	Course Title	Review	Assess.
811	Fundamentals of Mathematics	8/10	Fa 13
110	Elementary Algebra	8/10	Fa 13
111	Elementary Algebra 1	8/10	Fa 13
112	Elementary Algebra 2	8/10	Fa 13
115	Geometry	8/10	Su 13
120	Intermediate Algebra	8/10	Fa 13
122	Intermediate Algebra 1	8/10	Fa 13
123	Intermediate Algebra 2	8/10	Fa 13
130	Trigonometry	8/10	Fa 14
150	Mathematics for Elementary Teachers	8/10	Fa 14
190	Path to Statistics	2/13	Fa 14
200	Probability and Statistics	8/10	Fa 14
201	Quantitative Reasoning	8/10	Fa 14
222	Precalculus	8/10	Fa 13
241	Applied Calculus 1	8/10	Fa 14
242	Applied Calculus 2	8/10	Fa 14
251	Calculus with Analytic Geometry 1	8/10	Fa 15
252	Calculus with Analytic Geometry 2	8/10	Fa 15
253	Calculus with Analytic Geometry 3	8/10	Fa 15
270	Linear Algebra	8/10	Fa 15
275	Ordinary Differential Equations	8/10	Fa 15

- Courses assessed during Summer 2013 and Fall 2013 have had results and action plans uploaded to TracDat.
- Courses to be assessed during Fall 2014 have had SLOs mapped to PSLOs and ISLOs. Assessment methods are under review and will be uploaded to TracDat by the end of Spring 2014.
- Courses to be assessed during Fall 2015 have had their SLOs updated on TracDat. Assessment methods will be developed during Spring 2015.

B. Identify Patterns of Curriculum Offerings

Respond to the following:

- Identify the planning group's two-year curriculum cycle of course offerings by certificates and degrees.
- Describe the ideal curriculum cycle.
- Discuss any issues.

The Two-Year Curriculum Cycle All mathematics courses are offered every year, with most courses offered every semester. Availability of mathematics courses should not provide a barrier to timely completion of certificates, degrees or transfer. To address "Completion by Design" and to decrease entry and exit points where students have shown to be less successful, the following strategies are being employed:

- Fewer Math 111/112 and Math 122/123 courses are being scheduled therefore reducing entry/exit points
- Connection of supplemental instruction to entry level remedial Math classes such as Math 811
- Increase supplemental instruction support to other key Math courses where students struggle (MATH 120, MATH 130)
- Introduction of Math 190: Path to Statistics, which combines the algebra sequence and contextualizes content in supporting students for success in transfer level statistics

Issues and Possible Solutions

Full Time Faculty During the past three years, the mathematics department had ten full-time faculty covering courses requiring an average of 17.34 FTEF per semester. Even at eleven full-time faculty in 2013-2014, the ratio of full-time faculty to FTEF is only 63.4%. In Spring 2013, of the 68 sections offered, full time faculty taught 39 while 29 sections were taught by adjunct faculty. There is still a significant need for full time faculty in the department not only to teach sections but also to participate in ever increasing learning communities and collaborate across disciplines and the college. Almost every student who attends Skyline will take a mathematics course.

The Learning Center Faculty will create stronger coordination between the mathematics department and the Learning Center, a resource that is currently under-utilized. Improved coordination between the two entities regarding the timing and variety of workshops offered, as well as communicating the availability of the workshops will provide students with a valuable opportunity to increase their success.

MESA The MESA center is heavily utilized by many STEM students, with most of the seats filled throughout the day. The space available for this valuable program should be expanded to meet the high student demand.

Hours by Arrangement The department is currently exploring ways to better implement the hours by arrangement component of many of our classes. Current plans include use of online instructional tools and the implementation of faculty-led workshops through the MESA center and the Learning Center.

6. Response to Previous Annual Program Plan & Review

List any recommendations for the program and your responses to these recommendations based on previous Annual Program Plan and/or CTE Professional Accreditation report.

7. Action Plan

Provide your action plan based on the analysis and reflections provided in the previous sections.

Note: resource requests should be connected to action plans.

Respond to the following:

- Describe data and assessment results for SLO assessment on the course level (for instruction, including student service courses) or program level (for student services or every three years, career technical education programs). Analyze and reflect on SLO assessment results and other measures of Program performance.
- Analyze and reflect on other evidence described in previous sections. Identify the next steps, including any planned changes to curriculum and pedagogy.
- Identify questions that will serve as a focus of inquiry for next year.

Streamline the Student Learning Outcomes The PSLOs have been updated to include problem solving, multiple representations and grit. All course SLOs have also been updated to these same three outcomes. The new SLO, *Grit*, will replace SLOs concerning specific content. Our goal will be to improve student performance by focusing on encouraging perseverance rather than reorganizing or adjusting presentation of content.

Develop Tools to Assess Grit The new outcome, *Grit*, will require new assessment tools. The department is working on a combination of surveys and challenging problems to measure improvement in student determination.

Integrate Technology To better prepare students for majors and careers in technological fields, the department will increase integration of common mathematical tools in its courses. Students leaving Skyline College with STEM majors should have an introduction to commonly used tools such as MATLAB and Mathematica.

Reduce Cost of Required Materials Starting Summer 2014, several department members will be piloting a free textbook and course management system. The system is highly customizable, but will require a great deal of preparation before it is ready to implement. The department believes that the significant saving for the students is well worth the effort.

8. Resource Identification

A. Professional Development Needs

Additional Full-Time Faculty During the past three years, the mathematics department had ten full-time faculty covering courses requiring an average of 17.34 FTEF per semester. Even at eleven full-time faculty in 2013-2014, the ratio of full-time faculty to FTEF is only 63.4%. In Spring 2013, of the 68 sections offered, full time faculty taught 39 while 29 sections were taught by adjunct faculty. There is still a significant need for full time faculty in the department not only to teach sections but also to participate in ever increasing learning communities and collaborate across disciplines and the college. Almost every student who attends Skyline will take a mathematics course.

Time to Develop Low-Cost Materials Starting Summer 2014, several department members will be piloting a free textbook and course management system. The system is highly customizable, but will require a great deal of preparation before it is ready to implement. The department believes that the significant saving for the students is well worth the effort.

Time to Develop Integration of Technology The department has expressed a great interest in incorporating modern mathematical tools such as MATLAB and Mathematica in the curriculum. This would require training and collaboration.

B. Office of Planning, Research & Institutional Effectiveness Requests

Actions:

- List data requests for the Office of Planning, Research & Institutional Effectiveness.
- Explain how the requests will serve the Student/Program/Division/College needs.

STEM Versus Non-STEM Faculty have observed that students in STEM courses have seen higher success and retention rates than those in non-STEM courses. A request shall be made to the Office of Planning, Research and Institutional Effectiveness separating success and retention rated for STEM versus non-STEM courses as well as ratios of different ethnic groups in STEM courses to non-STEM courses.

C. Faculty and Staff hiring, Instructional Equipment, and Facilities Requests

Complete the following table:

Annual Program Planning Resource Needs

Program: Mathematics **Date:** 15 April 2014

	Needs	How does this request align with your assessment of student outcomes?	How does this request align with your action plan?	Estimated cost for facilities and equipment
Personnel Full time Math Faculty	With eleven full-time faculty in 2013-2014, the ratio of full-time faculty to FTEF is 63.4%. In Spring 2013, of the 68 sections offered, full time faculty taught 39 while 29 sections were still taught by adjunct faculty.	There is still a significant need for full time faculty in the department not only to teach sections but also to participate in ever increasing learning communities and collaborate across disciplines and the college. Almost every student who attends Skyline will take a mathematics course.	There is still a significant need for full time faculty in the department not only to teach sections but also to participate in ever increasing learning communities and collaborate across disciplines and the college. Almost every student who attends Skyline will take a mathematics course.	
Equipment				

Facilities				
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APPENDIX A

VISION, MISSION, VALUES AND GOALS OF SKYLINE COLLEGE

Please check current catalog for most recent goal statements.

Vision Statement

Skyline College inspires a global and diverse community of learners to achieve intellectual, cultural, social, economic and personal fulfillment.

Mission Statement

To empower and transform a global community of learners.

Values Statement

Education is the foundation of our civilized democratic society.

Thus:

Campus Climate: We value a campus-wide climate that reflects a 'students first philosophy' with mutual respect between all constituencies and appreciation for diversity. Both instruction and student services are dedicated to providing every student with an avenue to success.

Open Access: We are committed to the availability of quality educational programs and services for every member of our community regardless of level of preparation, socio-economic status, cultural, religious or ethnic background, or disability. We are committed to providing students with open access to programs and responsive student services that enable them to advance steadily toward their goals.

Student Success: We value students' success in achieving their goals, and strengthening their voices as they transform their lives through their educational experience.

Academic Excellence: We value excellence in all aspects of our mission as a comprehensive community college offering preparation for transfer to a baccalaureate institution, workforce and economic development through career technical education programs and certificates, Associate of Arts and Associate of Science degrees, basic skills development, and lifelong learning. We are committed to academic rigor and quality with relevant, recent, and evolving curriculum and well-equipped programs that include new and emerging areas of study. We are dedicated to an educational climate that values creativity, innovation and freedom of intellectual exploration, discovery, thought, and exchange of ideas.

Community Connection: We value a deep engagement with the community we serve and our role as an academic and cultural center for community including business, industry, labor, non-profits, government and the arts. We are dedicated to maintaining a college culture and institutional climate that is warm and welcoming to all.

Shared Governance: We value just, fair, inclusive, and well understood, transparent governance processes based upon open and honest communication.

Sustainability: We value an institutional culture that represents a strong commitment to environmental sustainability and justice. We are committed to the tenets of sustainability "To meet present needs without compromising the ability of future generations to meet their needs."

Appendix B

Definition of Terms

WSCH:	Weekly Student Contact Hours are based on the first census week of a Fall term. They do not include second census week data, but they do include all positive attendance data for the term (converted to WSCH) including classes which start after the first census
FTE:	The full-time equivalent faculty count is determined by the set of rules provided to each college at the time the data is requested. Generally, the figures are the decimal fraction of the teaching hours or units ascribed to the faculty member for teaching work done. Non-teaching time is specifically excluded so that it does not affect the value of the data. Work done by non-certified-personnel is not included.
LOAD:	Teaching Load is taken as the ratio of WSCH to FTE
N GRADES:	The total number of grades awarded ($A+B+C+D+F+CR+NCR+I+W$)
RETENTION:	The sum of all non-W grades divided by N grades times 100, expressed as %
SUCCESS:	$A+B+C+CR$ grades divided by N grades times 100, expressed as %