Division: Science

Career Technical Program(s) or Academic Discipline(s):

Anatomy and Physiology, Astronomy, Biology, Chemistry, Earth and Environmental Science, Energy Management, Physics, Water Conservation Technician

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1. Describe program review processes that inform your division's efforts to improve program or discipline student learning outcomes.

The Science Division is strongly committed to the comprehensive mission of Lane Community College. Members of the Science Division continually review and analyze student learning and success in all curricular areas. Much of this is done through reflection and conversation during regular discipline meetings and Division meetings throughout the year.

Annually, the Science Division undertakes extensive review and analysis of all disciplines and career-technical programs in the Unit Planning process. All members of the Division participate in the analysis, review and planning processes. The majority of division goals and initiatives are aimed at improving instructional programs to better meet students' needs for access and to provide more options—in terms of pedagogies, schedules, and topics—for learning and retention.

Furthermore, as part of our program review processes, discipline faculty and support staff analyze enrollment and retention trends; facilities and equipment needs; discipline-specific pedagogical best practices; and, employment trends and emerging industries. All these factors are weighed in decisions to revise curricula, offer new courses and programs, change delivery methods, set or remove prerequisites, enhance student engagement, and improve the myriad of other factors that affect the learning environments we provide for students.

In AY 2004, faculty in each Science transfer discipline developed learning outcomes for their areas. This was a first step toward systematic assessment of student learning outcomes in sequences of courses. Faculty assess student learning outcomes in a wide variety of methods, including written and practical exams, student projects (individual and group), portfolios (often combined with rubrics for grading), papers, presentations, and formal and informal classroom assessment techniques. Despite the development of broad student learning outcomes and the consistent use of detailed outcomes (objectives) in most science classes, few areas have developed formal, systematic assessment of student learning outcomes as yet.

Learning outcomes in the Energy Management and Water Conservation Technician career technical programs were developed and are continually updated in collaboration with industry-based advisory committees. Outcomes are assessed through course tests, practical field experiences, co-op work experience placements, national certification tests, and employment opportunities. New program areas are developed based on external scans of employment and industry trends.

In AY 2009, the assessment discussion in Science was renewed at the division level. These conversations will lead to an updated and comprehensive assessment plan for implementation beginning in AY10.

2. Based on assessments of program or discipline outcomes, what changes have been implemented since 2004 to increase student success and improve student learning?

Based on assessments of program outcomes in terms of retention and success, and formal and informal assessments of student learning outcomes, faculty and staff have a good understanding of the strengths and weaknesses of the curricula in their respective areas. In-depth conversations about each course sequence have led to many curricular improvements in the past five years. In each case, improvements were made to increase student access, retention and learning. The chart below describes each improvement; indicates the types of data that led to its development; and the result for students. Projects were funded through a variety of sources, including college curriculum development funds, Perkins funds for career-technical programs, supplemental instruction and learning community funds, Division funds, and the sweat-equity of faculty and staff.

In addition to these changes in curriculum and instruction, the college has invested heavily in technological upgrades to classrooms and laboratories in Science, which greatly enhance the learning environments for our students and support their retention and success.

Year	Project	Data for this change	Results for students
AY 2004 AY 2005	Implement Geographic Information System (GIS) Implement GIS Curriculum for Transfer Students and Technicians	Recognition of the lack of GIS skills and knowledge among science and social science students and faculty; no access to beginning courses; need to embed GIS literacy into science and social science classes	Resulted in a successful 3-year NSF grant from AY06-09. The grant project partnered social science and science faculty to develop a four-course certificate in GIS, and 26 embedded GIS modules in 11 disciplines, reaching about 1200 students. Assessment data are being compiled as part of the project's final report.
AY 2005	Revise Engineering Graphics, ENGR 115	Analysis of course needs of pre-engineering students; articulation needs	Updated and revitalized ENGR 115 course serving pre-engineering students
AY 2006	Enhance AP courses	Analysis of need for additional study aids and standardized laboratory and mentoring guides for faculty; student surveys and course evaluations.	Enhanced learning opportunities for students; greater consistency in AP courses taught by different faculty.
AY 2006	New courses: Bl 103K Gen Bio: Animal Behavior, Bl 103 Gen Bio: Field Biology in Costa Rica, Bl 102J, Gen Bio: Ethnobotany	Analysis of student demand for biology emphasis courses and high interest in these topics.	Developed new course options to meet non-majors' interests and needs; some met college diversity requirement.
AY 2006	CH 110 Chemistry in Everyday Life	Analysis of student demand for non-majors' chemistry course; interest in this topic.	Developed a new course option to meet non-majors' interests and needs. [course has been discontinued]
AY 2006	New courses in Earth and Environmental Science: G 146 Rocks & Minerals G 147 National Parks Geology	Analysis of student demand for geology courses; interest in these topics.	Developed two new courses: National Parks Geology and Rocks and Minerals.
AY2007	New courses in Astronomy lecture classes: ASTR 121 Astronomy of the Solar System ASTR 123 Cosmology & the Universe Added 1 credit to existing course: ASTR 122 Stellar Astronomy	Analysis of student demand for astronomy courses; interest in these topics.	Developed two new courses, completing a 3-term lecture only sequence.

Year	Project	Data for this change	Results for students
AY 2007	BioBonds Assessment of Student Success and development of activities that integrate topics in CH 112 and BI 112.	Analysis of need to assess and track student success in this prerequisite learning community; need to align the curriculum better.	Improved curriculum and organizational capacity to serve more students. Initial assessment activities were not continued due to lack of time and resources.
AY 2007	BI 101K Gen Bio: Introduction to Genetics	Analysis of student demand for biology emphasis courses and high interest in these topics.	Developed new course that also addresses genetics learning outcomes for health professions students.
AY 2007	BI 103L Gen Bio: Evolution & Diversity Online	Analysis of student demand for biology emphasis courses, and high interest in topics of evolution and diversity; need for more online options	Developed an online biology course, meeting Quality Matters standards
AY 2007	CH 114 Forensic Chemisty	Analysis of student demand for a non-majors chemistry emphasis course, and high interest in forensic chemistry	Developed a non-majors' course to introduce students to laboratory chemistry
AY 2007	SI for Biobonds and SI for Gen Chem	Analysis of retention and success in CH 112 and Gen Chem.	Developed supplemental instruction courses to assist students to succeed.
AY 2007	Sustainability Course of Study in Science, including ENVS 184, Global Climate Change	Analysis of curricula related to sustainability; gap analysis of potential new curricula	Highlighted science courses that support Lane's sustainability core value and developed a new Environmental Science course
AY 2008	Physics Curriculum Development	Analysis of learning needs of students and review of discipline specific pedagogies	Increased use of hands-on equipment and materials
AY 2008	ASTR 107 Revision of Astronomy Telecourse	Analysis of curriculum	Updated course activities and assessments; added Moodle components
AY 2008	BI 212 Principles of Biology Curriculum Development	Analysis of curricular changes needed for better articulation of majors' sequence	Smoother articulation of Biology majors' sequence with four-year colleges; improved course content and process skills
AY 2009	BI 101J, Gen Bio, Unseen Life on Earth Course Revision	Analysis of curriculum; need for updated online course.	Revised telecourse to be an online course, meeting Quality Matters standards
AY 2007	BI 101K Gen Bio: Introduction to Genetics Revision	Analysis of curriculum; need for more online course options.	Revised course to be an online course, meeting Quality Matters standards
AY 2009	Online AP sequence	Analysis of enrollment demand for additional AP	Implemented online AP sequence

Year	Project	Data for this change	Results for students
		courses; analysis of access options for students	
AY 2009-10	Hybrid AP sequence	Analysis of enrollment demand for additional AP courses; analysis of access options for students	In process of developing a hybrid AP sequence, to begin AY 2010
AY 2009	Physics Enhancements	Analysis of learning needs of students and review of discipline specific pedagogies	Increased use of hands-on equipment and materials
AY 2009	BI 103M Gen Bio: Biodiversity & Sustainability	Analysis of curricula related to sustainability; gap analysis of potential new curricula	Developed new course to support Lane's sustainability core value
AY 2009	WATR AAS Course Development: new AAS degree, with 9 – 11 new courses	National and state industry data; employer needs in a wide range of water conservation-related areas	Developed a new career tech pathway for an emerging sustainability industry
AY 2010	Access, Retention & Success: Learning Enhancements in AP (LEAP)	Student surveys and course evaluations; analysis of areas of difficulties for students	Will add study aids to increase student learning` and success.
AY 2010	Physics Enhancements	Analysis of learning needs of students and review of discipline specific pedagogies	Will continue to enhance and increase use of hands-on equipment and materials
AY 2010	CH 150, Preparatory Chemistry	Analysis of retention, success, and learning needs of Gen Chem students	Will instruct students in key concepts and skills to help them succeed in Gen Chem