



Presented by:

Empowering Special Need Students -Accessible On-line Biology Laboratory Experiences

Dr. Roy Mason Ms. Tessa Turner Mt. San Jacinto College

June 17-19, 2020 Virtual Conference

Empowering the Online Teaching Community for 20 Years

California Community Colleges

How do we actively engage ALL learners, including those with special needs, in successfully completing District Learning **Objectives (DLOs) and Course Learning** Objectives (CLOs) in a fully-on-line learning non-majors Biology Environment?







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MSJC Large Service Area (approximately 2500 square mile) Situated at the base of two mountain ranges 60 mile east of LA.





Mt. San Gorgonio 11,500'

Mt. San Jacinto 10,800'



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MSJC Transition to a Suburban Community College Western **Riverside County**

Established 1963

Rural Communities

Mostly Agricultural





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MSJC Significant Growth over last in last 20 years.





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College Service Area has Grown -Temecula, Murrieta, Menifee, Lake Elsinore, Perris, Beaumont, I 10 Corridor Enrollment Sky-Rocketed 15,000 FTES -20,000 head count



Menifee Valley Campus Arts Building



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MARGE BITETTI SOUTHERN CALIFORNIA WINE COUNTRY THROUGH TIME

The Vineyards and Wineries of Temecula





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MSJC Last 20 Years - Bedroom Commuter Communities for San Diego and Los Angeles Counties

2 Major Campuses San Jacinto Menifee Valley

Education Centers Temecula Banning



Menifee Valley Campus Technology Building



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More than 18 years ago, MSJC wanted to develop a fully online AS degree. How do we meet the science laboratory courses degree requirement*?

Issues:

*****Faculty Attitudes

*Course Rigor

*(4 Semester Unit Science with labs required For transfer to State Universities)







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Menifee Valley Campus Nursing and Science Buildings

Science Faculty Attitude "Over our dead bodies!"





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Course Rigor - Can student learning outcomes be achieved? Is the on-line laboratory experience on par with the on-campus experience?





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Curriculum Committee: Pilot a Course for Non-Major Introduction to Biology

First section of *Biology* 115 offered fully online in 2004

Within a year, the number of course sections increased to meet demand.

Tremendous student response.

Student performance information gathered.





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Research Concern

Some MSJC faculty and other higher education decision makers still questioning the equivalency of online courses to on-campus courses for degree completion and transferability.

Show me the data!





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Research Hypothesis

On-line course delivery is equivalent to on-campus course delivery in determining a student's level of attainment of student learning outcomes in a nonmajors introductory biology course.











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Biology 115 Course Student Learning Outcomes - Lecture

- 1. Analyze and solve problems using the methods of scientific inquiry, observation and measurement.
- 2. Integrate the basic principles of chemistry to construct an understanding of biology at the cellular, organismal, and ecosystem levels.
- 3. Learn the language of biology and correctly use terms in written and oral communication.
- 4. Know what defines life and be able to discuss biological organization extending from molecules to ecosystems.

5. Construct and illustrate the similarities and differences of prokaryotic and eukaryotic cells with regard to structure and function, illustrate traffic across membranes, and inspect the acquisition and use of energy in metabolic processes. 6. Evaluate and illustrate mitosis, meiosis, and the flow of information from genes to protein.





Biology 115 Course Student Learning Outcomes - Lecture

- 7. Characterize Mendelian principles of inheritance, and evaluate and appraise the significance of DNA technology.
- 8. Formulate hypotheses of how structure correlates with function at all levels of hierarchical organization.
- 9. Evaluate and draw conclusions about the interactions between organisms and the interactions organisms have with their environment and analyze the various mechanisms by which organisms maintain homeostasis.
- 10. Characterize and authenticate the unity and diversity of all organisms within the Kingdoms and Domains of classification.
- 11. Demonstrate the mechanisms of evolution, and analyze the evidence in support of evolutionary theory.
- 12. Relate the interdependent nature of science to technology, and evaluate the role of society in shaping the application of scientific knowledge.





Biology 115 Course Student Learning Outcomes - Laboratory

1. Engage in the collection of data using various measures, apply scientific methods to investigate biological principles, observe phenomena, test hypotheses, solve problems, and report in scientific format. 2. Using the periodic table, construct diagrams of atoms, molecules, and illustrate the bonding capacities, and design models of macromolecules. 3. Demonstrate proficient understanding of the principles of microscopy in the study of cells and microorganisms.

4. Illustrate and distinguish the differences between the cell types of prokaryotes and eukaryotes, compare and contrast their structures, and critique methods to differentiate organelles.

5. Evaluate the process of osmosis occurring across a semi-permeable membrane, and deduce direction of net water movement under isotonic, hypertonic, and hypotonic conditions.

6. Evaluate and illustrate the phases of mitosis and meiosis through direct observation of mitotically dividing onion root tip cells and other prepared slides.







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Biology 115 Course Student Learning Outcomes - Laboratory

7. Characterize the complexity of DNA by creating a model, extracting DNA from cells, and/or witnessing DNA technology and its applications. 8. Analyze natural selection including differential survival, reproduction. 9. Identify and critique representative organisms of the five kingdoms: major phyla of Kingdoms Animalia and Protista, classes of vertebrate animals, major divisions of Kingdoms Plantae and Fungi, and bacterial and fungal microorganisms. 10. Locate, describe and identify external anatomical structures and internal organs in a frog and compare their presence and function to that of human anatomy.

11. Identify, contrast and evaluate the chemical processes of photosynthesis and cellular respiration.

12. Evaluate the importance of organic molecules to living systems and their importance to human nutrition.

13. Use the laws of probability and a Punnet square to solve inheritance problems.







A majority of the data analyzed by this research indicate no statistically significant differences in completing student learning outcomes in on-line and oncampus courses in non-majors biology offered by the Menifee Valley Campus, Mt. San Jacinto College.





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New Question: Is Our On-line Course Accessible? Are Our On-line Classes as Accessible as Our Oncampus Classes?



Especially the Laboratories?



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New Question: Is Our On-line Course Accessible? DELTA Team

Worked with Course Designers to evaluate "Accessibility" of All aspects of the course including the laboratories.



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Faculty Attitude: Changes in Delivery **Original Format** New Format

Blackboard **Course Delivery** System

Canvas Course **Delivery System**

Combined with Combined with

"Kitchen labs"

"eScience labs"



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Previous Laboratory Materials - Kit was designed by MSJC Instructors Kitchen Labs

>Preserved Frog with dissection tray and dissection kit >Owl Pellet > Dialysis Paper >pH Papers >Graduated Cylinder >Metric Ruler > Thermometer >Metric Ruler > Thermometer > Beaker Home Grown Laboratory Manual



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Faculty Attitude: Changes in Laboratory

2015 - 2016 MVC Biology Department Faculty began process to evaluate laboratory portion of the on-line sections of Biology 115

> Goal of Evaluation: Propose a set of "Accessible" laboratory materials to complement laboratory exercises.





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Faculty Attitude: Changes in Laboratory

Fall 2015 - 2016 after reviewing numerous options Biology Department Faculty agreed to evaluate eScience laboratory materials for laboratory portion of the course







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What Does an Accessible Course Look Like?

Second half semester) - includes 4-6 sections offered each term with additional 4-6 in summer semester

Traditional 17 week classes - 4 sections each term

* Lecture materials presented with PowerPoint, video, and instructor-developed materials, use Canvas delivery system







What Does an Accessible Course Look Like?

* Course outline includes: twelve examinations, eight group discussions, and four scientific article reading evaluations.

Authentic Laboratory Experience: twenty (20) laboratory experiences, sixteen (16) require eScience laboratory kit, four (4) exercises which require no specific scientific supplies.







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What Does an Accessible Course Look Like?

Wanted a fully self-contained laboratory kit. Previous lab kit required students to purchase additional materials locally.

Concerned with "copyright" infringements.

Must Meet "Federal Accessibility Standards" ADA II.

Wanted a resource that would be easy for all instructors including "adjunct faculty".





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What Does an Accessible Course Look Like?



Authentic Experiential learning Hands-on experiments encourage student engagement Priorities in lab design are student safety and engagement **Rigorous digital curriculum**



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What Does Accessibility Look Like?

Students are provided a combination of hands-on science lab materials and supplies, virtual learning tools, and customized digital curriculum.

How Do We Make This Accessible?





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What Does Accessibility Look Like?

Staff includes Instructional Aide content expert who works with our faculty to integrate the laboratory exercises into our curriculum.

Ms. Tessa Turner, Instructional Aide Department of Biology

DNA Extraction





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What Does Accessibility Look Like?



SU 2020 BIOL-115 **Topics in Biology -ONLINE-**



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What Does Accessibility Look Like?

MSJC CANVAS:



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msjc.instructure.com/course	es/19901	
■ BIOL-115-3536	> Syllabus	
summer 2020 ઠેને Student View	SU20 BIOL-115-3536 Topics in Biology -ONLINE-	
Home		
Announcements		
Assignments		
Discussions		
Grades		
People		
Pages		
Files	Biology 115, Topics in biology is the introductory non-majors biology class at Mt. San Jacint	
Syllabus	designed for non-science majors and those who need a biology foundation before entering investigation of biological principles presented in an evolutionary context and an ecologica	
Outcomes Ø	biochemical processes, genetics, classification, diversity of life, ecosystems, evolution, and	
Quizzes	I want you to have a rewarding and successful college experience.! In my course I focus or	
Modules	to you as an individual and how they will be helpful in your understanding of scientific in students come from very diverse cultural, racial, social and academic background and t	
Conferences	the course. I sincerely appreciate this diversity of experience.	
Collaborations	Hopefully, you will acquire tool to help you analyze and evaluate various points of view abo	
NetTutor	with which we share this planet; now they are defined by scientific methodology and experi personal, social, and political decision making.	
Attendance	Biol 115 focuses on the study of living systems emphasizing experimental methodology, the	
Google Drive	encouraging an understanding and use of scientific methodology. BIOL 115 focuses on the including the importance of the study of biological processes of the human body.	
Instructor Course Evaluations	Specifically, in this course we examine the physical universe in the consideration of physical	
Office 365	complexities or living systems as well as the role of mechanical physics and energy in relatic characteristics that distinguish living systems from non-living systems; the genetic basis of	
	113-3336 Topics in B ×	



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o College. The course includes a lecture and lab component and is	To Do			
science major's curriculum. This course emphasizes scientific inquiry in framework. Principles covered include molecular and cellular biology, urrent issues.	Grade Reading/Written Assignment 1 - DUE June 14th	×		
the study of living systems but my emphasis is how these topics relate nation you encounter in your everyday life. I recognize that all my ach and every one of you brings a unique and individual perspective to	 SU points • Jun 14 at 11:59pm Grade Chemical Bonding Fundamentals Assignment 100 points • Jun 15 at 11:59pm 	×		
It many different aspects of the many different kinds of living systems mentation; and how you can relate this information to your own	2 Grade Nutrition Assignment 100 points • Jun 17 at 11:59pm	×		
testing of hypothesis, and the power of systematic questioning najor scientific concepts in the natural science discipline of biology	2 Grade Energy and Photosynthesis Assignment 100 points • Jun 19 at 11:59pm	×		
and organic chemistry as it relates to the physical and physiological nship to the cyclic processing of energy. We examine the iving systems: the evolution and development of cellular living	Grade Microscope Assignment 100 points • Jun 19 at 11:59pm	×		
ment of living a sector state to state of under of conduct wing	2 more		•	



So What Do You Think? On-line in Your Genes? **Questions and Comments**





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Contact Information

Thank you so much for your attendance.

Please feel free to contact either of us for any questions, concerns and/or a copy of this Power Point Presentation or additional information on our research project.

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