

REPORT:

Development Process for MTH/STAT 108 “Data Science Explorations”

Course Need

There is growing interest across Oregon colleges, universities, and high schools to offer a 100-level data science survey course. For example, Chemeketa Community College launched [Data 101 “Introduction to Data Science”](#) in Fall 2022. Linn Benton and Portland Community Colleges are both exploring ways they might add a similar course to their catalogs. Many Oregon high schools have recently added data science courses, but are unable to find sponsors for dual credit, as 100 level data science is not offered at most higher education institutions in Oregon.

A course development team, described in the next section, is designing a 100 level data science course, “MTH/STAT 108” for statewide use and possible common course numbering approval. Our team presented our course plans and sought input at Spring 2024 events (AMATYC and virtual input sessions). Our participant institutions reflect broad and significant interest in this course:

Oregon Colleges and Universities	Oregon School Districts	Other
American College of Healthcare Services	Bend LaPine SD	Bellevue College, WA
Big Bend CC	Bethel SD	Clark College, WA
Central Oregon CC	Forest Grove SD	Highline College, WA
Chemeketa CC	Gresham Barlow SD	Intermountain ESD
Clackamas CC	Hermiston SD	North Clackamas ESD
Columbia Gorge CC	Hood River Valley SD	Oregon Department of Education
Eastern Oregon University	Lane CC	St. Lawrence University, NY
Lane CC	Linn Benton CC	Tacoma CC, WA
Linn Benton CC	Mt. Hood CC	
Mt. Hood CC	North Santiam SD	
Oregon Institute of Technology	Parkrose SD	
Oregon State University	Portland Public Schools	
Portland CC	Reynolds SD	
Rogue CC	Roseburg Public Schools	
	Sherwood SD	
	Springfield SD	
	St. Helens SD	

*Attended by Patti Frasier Lock, GAISE III Report

Course Development

Because this course has the potential to benefit students across many settings (high school, 2 and 4 year colleges and universities) and should be designed with different institutional needs in mind, our course design team represents instructors working in diverse roles.

Course designers:

Kelly Mercer	Clackamas Community College, Math Department Chair
Colleen Smyth	Roosevelt High School, Portland Public Schools, Data Science Teacher
Rachel Webb	Portland State University Math Department, Senior Instructor II and Dual Credit Statistics Coordinator

Course development work started summer 2024. During the 2024-2025 school year, course pilots will run at PSU and Roosevelt High School in PPS, with course refinements and publication by June 2025.

Note:

This project is supported by an Oregon Department of Education Mathways grant. Project management and professional learning for course instructors will be developed by Amy Lindahl (K-12 Math and Science Specialist, Multnomah ESD) and Jaclyn Pfenning (Math Consultant). Julia Betts, Executive Director of the South-Metro Salem STEM Partnership, is the grant manager.

Course Design Decisions

Design decisions were made with statewide use in mind. For elements like course name and learning outcomes, the design team reviewed input session responses, researched current course offerings in Oregon, and considered what would work best across institutions. Our process and outcomes are described below.

Course Element	Decision Process	Endpoint
Course number	We considered MTH/STAT 143, to indicate possible sequencing of this course with STAT 243z, but decided that overly suggested how the course might be used. Then, we looked for MTH numbers (110-110) that were unused in Oregon. Currently available: MTH: 104, 108, 109. MTH 104 might communicate a false sequencing with MTH 105z, so we selected 108. We list both MTH/STAT to allow	MTH/STAT 108 List of Schools

	institutions to select the prefix that best fits their needs.	
Course Name	We sought a name that is 1) welcoming/understandable for high school-higher ed students 2) suggests that this is a survey course/does not specifically prepare students for a data science program/degree. “Explorations in Data Science” was our initial choice, but this name is used by YouCubed for their data science course. We slightly reworded our title to “Data Science Explorations.” This name meets our criteria and was also suggested by an input session participant.	“Data Science Explorations”
Course Description	We used two sources during the writing process: Chemeketa’s DATA 101 syllabus and MTH 105z (to avoid possible overlap) to write our course description. We presented our first draft for feedback at our May 2024 virtual input sessions and revised based on participant feedback.	“In this survey course, students engage with concepts present in multiple fields devoted to understanding and using data. Technology is used throughout as a powerful and necessary tool for robust data exploration and analysis. Students should emerge from the course with a deeper knowledge of the crucial role of data in society and appropriate methodologies for data organization, visualization, analysis, and reporting. Emphasis is placed on preparing students for ethical and informed engagement with data both in future courses and life beyond academia.”
Learning Outcomes	We used two sources during the writing process: Chemeketa’s DATA 101 syllabus and MTH 105z (to avoid possible overlap) to write our learning outcomes. We presented our first drafts for feedback at our May 2024 virtual input sessions and revised based on participant feedback.	“At the end of this course, students will be able to: 1. Analyze real world data, making and evaluating predictions, and identifying potential errors, sources of bias, and issues of ethics. 2. Utilize appropriate technology, including programing and

		spreadsheets, to organize, evaluate, visualize, and analyze data. 3. Apply the data science cycle to develop and answer statistical questions about univariate, bivariate, and multivariate data. 4. Create clear and compelling communications in multiple formats, including data visualizations with supporting narratives, for specific audiences. 5. Develop identity-informed confidence and agency as emerging data scientists to engage in ethical data practices and decision making.”
Course Materials	Course materials are designed to be used by instructors in many settings and with varying degrees of background in data science. With this in mind, all student materials will be located in Google Drive folders. Instructor supports (PD, discussion boards, instructor directory and more) will be hosted via a free Canvas course. Course developers are also planning to add student materials to a Canvas course (paid version) and upload to the Canvas Commons for instructors who use that LMS. As the course is translated into additional LMSs, instructors will have mechanisms for sharing their work.	Google Drive with student materials Free Canvas Course for Instructors Oregon Open Learning Page: Coming in late 2025
Technology and Accessibility	Student use of technology links to multiple learning outcomes in this class, but, depending on course setting, could easily create accessibility barriers.	Google Sheets for spreadsheet work R for programming and advanced data

	Our accessibility criteria for student-use technology are: • Free, browser-based software • Runs on Chromebooks • Use of software/student accounts widely approved by technology departments We decided that students would use Google Sheets for spreadsheet work (not all students have access to MS Excel). We were also aware that selecting a programming language is controversial. Possible languages were narrowed down to Python or R (standard for introductory data science courses), but heard conflicting feedback from our input session participants around which language had best ease of use and was most applicable in programs and majors. Data visualizations will be an important part of this course, and new users will benefit from the existing packages in R. This language appears to have an easier learning curve for students and instructors. R is commonly used in Statistics courses and businesses. For these reasons, we selected R as the course programming language. R also has an in-house cloud based programming platform (Posit Cloud), which has already been approved by some K-12 school districts. Python does not have a similarly accessible platform as there have been district approval hiccups for both Google Colab and Kaggle.	visualizations
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