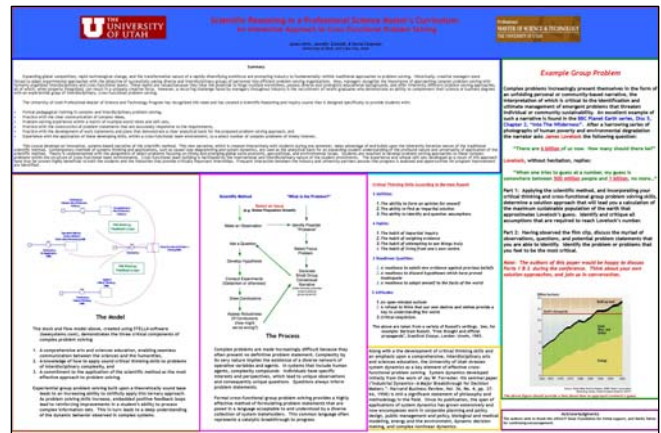


Scientific Reasoning in a Professional Science Master's Curriculum: An Interactive Approach to Cross-Functional Problem Solving

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Expanding global competition, rapid technological change, and the transformative nature of a rapidly diversifying workforce are prompting industry to fundamentally rethink traditional approaches to problem solving. Historically, creative managers were forced to adopt experimental approaches with the objective of successfully yoking diverse and interdisciplinary groups of personnel into efficient problem solving organizations. Now, managers recognize the importance of approaching complex problem solving with formerly organized interdisciplinary and cross-functional teams. These teams are valued because they have the potential to forge multiple worldviews, possess diverse and synergistic educational backgrounds, and offer inherently different problem solving approaches, all of which, when properly integrated, can result in a uniquely creative force. However, a recurring challenge faced by managers throughout industry is the recruitment of recent graduates who demonstrate an ability to complement their science or business degrees with an experiential grasp of interdisciplinary, cross-functional problem solving.



The University of Utah Professional Master of Science and Technology Program has recognized this need and has created a Scientific Reasoning and Inquiry course that is designed specifically to provide students with:

- Formal pedagogical training in complex and interdisciplinary problem solving,
- Practice in the clear communication of complex ideas,
- Problem solving experience within a matrix of multiple world views and skill sets,

- Practice in the construction of problem statements that are accurately responsive to the requirements,
- Practice in the development of work statements and plans that demonstrate a clear analytical basis for the proposed problem solving approach, and
- Experience with the application of these developing skills, within a cross-functional team environment, to a select number of complex problems of timely interest.

This course develops an innovative, systems-based narrative of the scientific method. This new narrative, which is created interactively with students during one semester, takes advantage of and builds upon the inherently iterative nature of the traditional scientific method. Contemporary methods of systems thinking and applications, such as causal loop diagramming and system dynamics, are used as the analytical basis for an expanding student understanding of the profound nature and universality of application of the scientific method. Theory is complemented with the assignment of select problems focusing on timely and emerging global socio-economic, geo-political, and environmental issues. Students are required to develop problem-solving approaches to these complex problems within the structure of cross-functional team environments. Cross-functional team building is facilitated by the international and interdisciplinary nature of the student enrollments. The experience and unique skill sets developed as a result of this approach have thus far proven highly beneficial to both the students and the industries that provide critically important internships. Frequent interaction between the industry and university partners assures that progress is assessed and opportunities for program improvement are identified.