Syllabus Analysis of Learning Outcomes in High Enrollment LA&S Courses:

Executive Summary:

An examination of select course syllabi from high enrollment LA&S courses in each of the course clusters was conducted to explore the potential overlap between courses, clusters and student learning outcomes. Seven faculty from fields related to those being examined assessed the syllabi for the representation of learning outcomes using definitions provided below. When possible at least two different syllabi from different instructors were used to conduct the analysis of an individual course. Nonetheless, this analysis cannot accurately capture the learning outcomes represented by any individual course. Because the learning outcomes may not be accurately represented by an individual course syllabus, the course syllabie sampled may not represent the majority of syllabi for such high enrollment multi-section courses, and the interpretation of the language of the syllabus may not match the intention of the instructor, this analysis can only serve as a general indication of the types of courses that might potentially support particular learning outcomes.

Taking into account the limitations of the analysis, there appear to be some relevant groupings of courses within clusters that support common learning outcomes, along with a few examples of courses within clusters that don't align with the learning outcomes represented by most other courses in the cluster. Within the Arts cluster, literature courses such as American Literature II and Art or Music courses such as Commonwealth of the Arts support Aesthetic Appreciation through Critical Analysis of works of art. On the other hand, Writing I and II within the Arts cluster do not appear to emphasize Aesthetic Appreciation, instead providing support for Written Communication skills, with a particular emphasis on the application of Critical Thinking and Information Literacy to the construction of written arguments. Many of the Citizenship and the World Cluster courses offered through the Department of Economics, History and Political Science also emphasize using Information Literacy and Critical Thinking skills to construct and justify arguments, in these cases specifically the critical analysis of issues and events. The skills of Citizenship emphasized in theses courses predominantly involved the potential to understand and interpret current events, rather than to engage in ethical decision-making or direct civic involvement.

The courses in the Citizenship and the World cluster offered through the Behavioral Sciences Department did not focus on Citizenship as a learning outcome. Instead, they focused on one of two forms of Problem Solving. The courses Introduction to Sociology and Human Growth and Development focused on Problem Solving through critical analysis of personal decisions and actions, while the course General Psychology focused on Problem Solving through Scientific Inquiry and Analysis. Many of the courses in the SMT cluster, particularly the science courses and Applied Statistics also focused on Problem Solving through Inquiry and Analysis. In contrast some Math courses and Introduction to Computer Science, focused on yet other forms of problem solving, involving constructing and analyzing logical arguments to generate a solution including through

programming. Among the SMT courses, Health and Fitness alone did not have stated learning outcomes related to these forms of problem solving.

Overall the analysis suggests that our clusters do not completely align with our learning outcomes, but might do so with some regrouping. Our Literature, Art and Music courses represent one cluster of courses that support outcomes related to Aesthetic Appreciation through Critical Analysis. Our courses offered in History and Political Science in particular, support outcomes related to Citizenship through Critical Analysis of Issues and Events. Our Science courses, including General Psychology and along with Applied Statistics and Business Statistics, support outcomes related to Problem Solving through Scientific Inquiry and Analysis. Our Math and Computer Science courses along with our Sociology, Human Growth and Development and Health and Fitness courses, may represent other expressions of problem solving, some like mathematics relying more heavily on quantitative literacy, while others like Sociology, Human Growth and Development and perhaps even Health and Fitness, rely more heavily on personal reflection. Some skills like Communication and Information Literacy cut across many clusters, but would benefit from more standardized representation in the curriculum. However, perhaps the biggest issue is that almost none of our courses support Civic Engagement or Ethical Reasoning.

Definitions (LA&S Outcomes in bold, <u>AAC&U outcomes underlined</u>**):**

Communication

The LA&S Communication outcome encompasses a broad range of communication skills:
Students will speak, read, write, and listen to create and understand meanings using a variety of media. They will recognize how to participate in or lead groups to accomplish goals.
The AAC&U Essential Learning Outcomes include many of the outcomes encompassed by our LA&S Communication Objective

<u>Reading</u>

Reading is the process of decoding text while simultaneously extracting facts and meaning through active interaction with written language.

<u>Writing</u>

Written communication is the development and expression of ideas in writing. Written communication involves learning to write in multiple genres and styles while adhering to grammatical and syntactical conventions. It can involve working with different writing technologies, and mixing texts, data, and images.

<u>Oral Communication</u>

Oral communication is a prepared, purposeful presentation designed to increase knowledge, to foster understanding, or to promote change in the listeners' attitudes, values, beliefs, or behaviors.

Civic Engagement

The AAC&U and MA Vision Project definitions of Civic Engagement encompass both the knowledge and skills we define as citizenship in our LA&S program as well as the ability to address values in ways that we define as ethical reasoning:

Civic engagement is working to make a difference in the civic life of our communities and developing the combination of knowledge, skills, values and motivation to make that difference. It means promoting the quality of life in a community, through both political and non-political processes.

Citizenship

Students will articulate the relationships among local, national, and global concerns, interests and needs. They will recognize possibilities and opportunities to enact positive change on an individual or group level.

Ethical Reasoning

Students will recognize the ethical issues involved in human actions and be able to formulate a set of principles and virtues which can be brought to bear in personal and public decision making.

Problem Solving and Synthesizing

The LA&S Problem Solving outcome encompasses a broad range of skills associated with critical analysis, logical reasoning, inquiry, information literacy and quantitative literacy:

Students will think critically and synthesize ideas within and across disciplines. They will fuse experience, training and research into considered judgment, then working individually or with others, form problem solving strategies and evaluate their effectiveness. Among these strategies, students will analyze and interpret data as a means to evaluate arguments and make informed choices.

The AAC&U Essential Learning Outcomes include many of the outcomes encompassed by our LA&S Problem Solving Objective

Critical Thinking (Critical Analysis and Logical Thinking)

Critical thinking is a habit of mind characterized by the comprehensive exploration of issues, ideas, artifacts, and events before accepting or formulating an opinion or conclusion.

Inquiry, Analysis and Information Literacy

The ability to recognize when information on an issue is needed and identify, locate, evaluate and effectively and responsibly use and share that information.

Quantitative Literacy

Quantitative Literacy (QL) – also known as Numeracy or Quantitative Reasoning (QR) – is a "habit of mind," competency, and comfort in working with numerical data. Individuals with strong QL skills possess the ability to reason and solve quantitative problems from a wide array of authentic contexts and everyday life situations. They understand and can create sophisticated arguments supported by quantitative evidence and they can clearly communicate those arguments in a variety of formats (using words, tables, graphs, mathematical equations, etc., as appropriate).

Aesthetic Appreciation

The LA&S Aesthetic Appreciation outcome does not correspond with a particular AAC&U Essential Learning Outcome, but the skills involved include those related to critical thinking, specifically in the context of works of art.

Students will examine various forms of artistic and literary works, understand the context from which they emerge, and be able to articulate and defend their meanings and values.

Arts

An analysis of selected syllabi from 4 high enrollment Arts cluster courses offered by faculty from the Humanities and English Studies programs illustrated the ways in which Critical Thinking and Aesthetic Appreciation overlap, as well as important distinctions between Writing courses and courses with a more aesthetic focus (Table 1). Writing I and II focus on Critical Thinking through the use of Information Literacy skills to understand and construct text-based arguments. In contrast, the courses U.S. Literature II and Commonwealth of the Arts focused on Critical Thinking in the context of analyzing the relationships between different texts or other forms of art, and the periods and beliefs that influenced their creation. This form of critical analysis overlaps heavily with the concept of Aesthetic Appreciation as defined in our LA&S curriculum to the extent that Aesthetic Appreciation could be considered as one form of Critical Thinking. The evidence from syllabi suggest that while Writing I and II do not focus on Aesthetic Appreciation, it is likely to be found as a common element of our Art or Music and Literature courses. As the course titles suggest, Writing I and II focus on the Communication skill of Writing, with some emphasis on reading and oral communication as well. The English Studies department has developed goals and objectives for writing courses that provide some consistency in expectations across Writing I and II. Opportunities for developing reading and oral communication skills can also be found in courses like U.S. Literature II and Commonwealth of the Arts, but the ways in which these learning outcomes are emphasized vary across courses. There was no evidence for outcomes related to Civic Engagement, Citizenship, Ethical Reasoning or Problem Solving through Inquiry and Analysis or Quantitative Reasoning in any of the Arts cluster courses examined. Instead these courses may most strongly support the outcomes of Writing and Information Literacy in the cases of Writing I and II, and Aesthetic Appreciation in the cases of Literature and Arts of Music courses.

Table 1: Analysis of Learning Outcomes in the Arts Cluster

Objectives	ENGL 1100: Writing I	ENGL 1200: Writing II	ENGL 2100 American Literature II	MUSC 2000: Common-wealth of the Arts
Communication				
Reading	Encourages students to annotate readings and take notes that summarize and respond to the text.	Practice 'active' or 'rhetorical' reading, annotating each text as you read.	Share open responses on the reading and respond to a prompt (seems it could be related to the readings or the student's writing process). Heavy emphasis on close reading.	Builds on historical survey model.
Writing	Engage with the ideas of others to produce "inquiry" papers, not persuasive or argument essays exactly, but rather papers that focus on exploration and analysis. English department goals and objectives on writing available at http://www.fitchburgstate.edu/academics/academic-departments/english-dept/first-year-writing-program/	Demonstrate in their writing a knowledge of rhetoric, uses of evidence, process-oriented writing, and academic community. English department goals and objectives on writing available at http://www.fitchburgstate.edu/academics/academic-departments/english-dept/first-year-writing-program/	Uses class discussion and email journals to prepare students to write essays.	Does write a review. Length and rigor aren't defined.

Oral Communication		"Why Is Research Writing Important?" Interviews in at least some sections.	5 minute Oral Presentation on close reading three passages and giving contextual information on the author and text	Presentation in at least one section. Unknown subject and purpose for the presentation.
Civic Engagement				
Citizenship				
Ethical Reasoning				
Problem Solving				
Critical Thinking	Cultivate the skills of argumentation, uses of evidence, analysis, close reading of texts (in any number of forms), and revision	Implicit throughout the research and writing process.	Read and understand each text on its own terms, but we will in various explicit and implicit, group and individual, ways attempt also to put them in dialogic relation to one another and to our developing ideas of American literature, history, and identity.	The student will learn how human creativity in various historical periods reflects and affects the beliefs of each period. The student will learn to identify and describe artwork from various times and places.
Inquiry and Analysis				
Quantitative Reasoning				

Information Literacy	Incorporating, in appropriate and interesting ways, references to a variety of types of texts as evidence for your analysis.	1) articulate importance of and employ a variety of research methods and genres; 2) obtain and evaluate reference materials, books, and articles, among any other sources needed; 3) use MLA or APA citation formats properly;		
Aesthetic Appreciation			Put them in dialogic relation to one another and to our developing ideas of American literature, history, and identity.	Students are expected to develop and refine tools and strategies for music and art appreciation, awareness, and research, to be able to place them in a stylistic and socio-historical context, and to augment their self-expression abilities.

Citizenship and the World (Excluding Behavior Designation Courses)

An analysis of syllabi from 5 of the highest enrollment Citizenship and the World Cluster courses offered by faculty from the Department of Economics, History and Political Science revealed some shared learning outcomes as well as some interesting differences. The analysis was restricted to comparing these courses because feedback from faculty in Psychological Sciences had already suggested that their courses might not align well with the Citizenship and the World cluster designation. Across the courses Global Issues, Principles of Macroeconomics, U.S. History II, U.S. Government and World Civilizations II, there was a fairly consistent emphasis on Communication skills including Reading, Writing and Oral Communication. However, it should be noted that only U.S. Government focused in the syllabus on a role for note-taking as a part of the reading process, and only Global Issues and World Civilizations II suggested the need for a formal oral presentation in the course. Writing expectations seemed somewhat more consistent across the courses, with the exception of Principles of Macroeconomics for which it was unclear whether there was an expectation that students write any form of research paper. The use of evidence from various sources was expected in all of the courses except Principles of Macroeconomics, although in World Civilizations II this evidence appeared to be drawn only from the text rather than outside sources.

While these courses are all in the Citizenship and the World cluster, evidence for the learning outcome Citizenship was lacking for some of them. Citizenship received little mention in the Principles of Macroeconomics course and none in U.S. History II. The related outcomes of Civic Engagement and Ethical reasoning that might show a student's ability as a citizen to act for the greater good in an ethically conscious manner were very underrepresented in theses syllabi. Only Global Issues suggested that students might develop solutions to problems and exhibit judgment in decision-making. In general to the extent there was a focus on being a citizen, the focus in these courses was on providing knowledge of current or historical issues and events rather than skills for acting responsibly in a civic context.

Students in a number of the courses were encouraged to develop skills for critically analyzing issues and events to better understand them. While no mention of critical thinking appeared in Global Issues or Principles of Macroeconomics, there was clear evidence of the expectation that students would critically evaluate evidence in U.S. History II, U.S. Government and World Civilizations II. Finally, none of the courses really included any learning outcomes related to aesthetic appreciation or to problem solving either through quantitative reasoning or inquiry and analysis. One possible exception would be Principles of Macroeconomics which suggest some problem solving without specifics.

In general, it appears that 4 of the 5 courses share a reasonably high overlap of learning outcomes, but those learning outcomes are less related to fostering skills of civic decision-making and action, and much more closely linked to critically analyzing contemporary and historical issues and events, often drawing on information literacy skills.

Table 2: Analysis of Learning Outcomes in Citizenship and the World Cluster (Without Human Behavior Designation Courses)

Objectives	IDIS 1800: Global Issues	ECON 1100: Principles of Macroeconomics	History 1500 U.S. History II	POLS 1000 U.S. Government	HIST 1100 World Civilizations II
Communication					
Reading	Required readings Journal commentaries	Each weekly assignment includes essential reading expectations.	Weekly Online Textbook Reading and Homework	Reading skills include comprehension and note-taking, an attention to historical detail and context, as well as developing your own ideas and arguments. As you read, take notes. Look for the main idea of the reading and note how these relate to previous things we have discussed in class. Review your notes before coming to class to be prepared for the discussion and the daily writings.	The course consists of extensive reading,
Writing	Journal commentaries Research papers	Writing assignments are assigned regularly.	Craft an effective thesis statement and evidence-supported arguments	Writing skills link the ideas of others to your ideas and arguments. Writing begins by developing your knowledge of history	The package requires using documents from the book, developing a thesis, and writing a five page paper analyzing your

				and context through your note taking on the readings and on the in-class lectures. Writing connects the arguments of others to your own developing "voice." Think about writing as a dialogue between yourself and the ideas and voices of the authors and texts with which we engage. Writing serves as way to connect the past to the ideas, themes and debates of the present.	documents
Oral Communication	Presentations Extra credit presentation Simulation	Some of the topics covered in this course can be controversial. Students are strongly encouraged to develop and express their views, while remaining open-minded and respectful of their classmates and the instructor.		Discussion skills are an application of your reading and writing skills. Discussion skills involve direct participation and engagement with the text, the ideas of the authors and the ideas of others in the class. To participate in class discussions, you will need to work on your	articulation skills—cultivating professional skills through formal presentations (oral and written) in communicating numerous ideas and issues that humans had to deal with in a global context.

				reading and writing skills. I will call on **everyone** in class. Your participation is crucial to the success of the class and your success in developing your discussion skills.	
Civic Engagement	My hope remains that each of you comes away with more abilities to decipher the complex world and understand its intricacies, as best as we can, by developing notions, perhaps solutions, to seemingly intractable global problems.				
Citizenship	Through an examination of these issues, this course is designed to offer the students a greater understanding of how the global	This course is dedicated to the concepts of citizenship.		Students will be required to stay up-to-date on current news in American politics. Please read and check daily newspapers or websites like the Boston Globe, the New	Students will develop a basic knowledge of the key historical issues and events and a better understanding of global political interaction over the

	arena operates, as well as of the current situation in different parts of the world.			York Times, or the Washington Post to stay up to date on current politics.	past two centuries.
Ethical Reasoning	The course aims to strengthen the student's grasp of and judgment of a smaller world community of decision-making.				
Problem Solving		This course is dedicated to the concepts of problem solving each week.			
Critical Thinking			Not only does college-level history refresh students with the core events of American history, it teaches them how to think critically about the past, to question sources, and to review arguments for their merits. In college history students are not solely responsible for	Linking all of these skill sets, you will also be asked to cultivate and develop your own critical, analytical, and thinking skills, in essence, your "voice."	Students will develop fundamental geographic knowledge, skill in analysis and critical thinking by examining primary source documents, and the ability to use the historical method in order to better understand the impact of global events on their lives.

			memorizing content; they are responsible for developing their own views of that content, and to demonstrate their ability to use that knowledge and views to create their own arguments		
Inquiry and Analysis					
Quantitative Reasoning					
Information Literacy	Always draft an Objective by identifying two key arguments and define which is your top argument and secondary argument, integrating endnotes into this one sentence.		Be able to use both primary and secondary sources in papers and argumentation to investigate historical questions, analyze sources, and verify claims with evidence	Sources and information for good scholarly writing and discussion come in many forms. You will distinguish between primary historical documents and secondary academic commentary on these primary sources. By being aware of these distinctions, you will enter the scholarly conversation and focus on the	

				differences between opinion, argument, and evidence in the information you are sifting through. You will make distinctions in both paper and electronic sources between scholarly, journalistic, and mass public sources and you will use (or not use) each when appropriate for evidence and argument.	
Aesthetic Appreciation					

Citizenship and the World (Behavior Designation Courses)

Analysis of learning outcomes in the three most highly enrolled "Behavior" designation courses within the Citizenship and the World (CTW) cluster illustrate that they vary from those represented in the other CTW courses (Table 3). The courses General Psychology, Human Growth and Development and Introduction to Sociology are taken by students to satisfy the CTW requirements, in which all students must take at least one of these "Behavior" courses. While many of the other CTW courses highlight citizenship as a learning outcome in terms of students understanding global issues and events, citizenship is not highlighted in the syllabi of these "Behavior" courses. Instead, these courses focus on Problem Solving, but in two different ways that are distinct from the types of critical thinking highlighted in other CTW courses. Both Human Growth and Development and Introduction to Sociology seem to emphasize problem solving through critical analysis of one's own individual decision-making in life in the context of psychological and sociological theory. On the other hand, the course General Psychology emphasizes Problem Solving through critical thinking particularly related to the scientific method and statistical analysis. These outcomes of General Psychology are similar to those observed in syllabi from lab science courses in the Science, Mathematics and Technology cluster. None of these outcomes are closely aligned with the critical thinking outcomes of other CTW courses which tend to focus on analyzing sources and effectively using those sources to construct arguments. While a number of the other CTW courses also highlight the importance of Information Literacy, there were no direct references to information literacy as an outcome of these "Behavior" cluster courses. Furthermore, while all three courses placed some emphasis on Communication-related outcomes, there was a great deal of variation in the extent to which reading, writing and oral communication were emphasized in the different syllabi.

Table 3: Analysis of Learning Outcomes in Citizenship and the World Cluster Behavior Designation courses.

Objectives	PSY 1100: General Psychology	PSY 1200: Human Growth and Development	SOC 1100: Introduction to Sociology
Communication			
Reading			To foster and improve critical thinking, reading and writing skills; Be conscious of your reading strategy. When you start a new piece ask yourself why the reading

			has a particular title. Browse the reading, focusing on headings to get a sense of what it is about before you begin focused reading. Reading the introduction and conclusion first can also be helpful. After finishing a chapter, review what you read. What was the main point?
Writing		Because your writing is critical to your performance in the course, it is very important that all of your assignments be well-written.	A detailed outline of the presentation and one- to- two page summary of the presentation with references must be submitted to me on the day of presentation.
Oral Communication	Develop oral communication skills through classroom discussion		In class discussion you do not have to demonstrate that you understand everything. After all, you're just learning the material. But you do have to be willing to talk about what you read.
Civic Engagement			
Citizenship			
Ethical Reasoning			
Problem Solving	Develop problem-solving skills through classroom activities	In both simulations, you will be asked to make decisions that will impact the development of your virtual child or virtual self.	The journal is an opportunity for you to demonstrate your understanding of course concepts and relate them to your own lives.

Critical Thinking	Develop critical thinking skills by participating in classroom discussion and exercises	… reflect on the decisions you've made and relate those to concepts learned in the course..	The overall goal throughout the course is to ignite in students a critical approach toward the understanding of their social world with a view to bringing some new insights to their daily life.
Inquiry and Analysis	Understand empirical reasoning and the scientific method; Learn about various methods of data collection		
Quantitative Reasoning	Appreciate how psychologists rely on statistics to interpret research findings		
Information Literacy			Be able to use both primary and secondary sources in papers and argumentation to investigate historical questions, analyze sources, and verify claims with evidence
Aesthetic Appreciation			

Science Technology and Mathematics Cluster

Courses in the SMT cluster are presented in two separate groups (Tables 4 and 5). Prior work on assessment of our SMT courses had made it clear that there were two different types of problem solving outcomes exhibited in student work, outcomes related to problem solving through inquiry and analysis and problem solving through quantitative reasoning with the former more prevalent in laboratory science courses and the latter more prevalent in mathematics courses. This pattern reemerged in our syllabus analysis. The courses, Health and Fitness, laboratory science courses and statistics courses, seemed like likely sources of learning outcomes related to inquiry and analysis as well as quantitative reasoning and for the most part they were (Table 4). While Health and Fitness lacked any explicit emphasis on problem solving, inquiry and analysis or quantitative reasoning, Earth Systems Science, General Chemistry II, General Biology II, Business Statistics, and Applied Statistics, all included explicit references to some of these forms of problem solving in their syllabi. All of those courses addressed problem solving through inquiry and analysis in particular, and while General Chemistry II and General Biology II did not explicitly address quantitative reasoning in their syllabi, the content of the courses suggest a strong emphasis on quantitative reasoning as well. In contrast, three other SMT courses were notable for lacking much language explicitly indicating learning outcomes related to problem solving through inquiry and analysis or quantitative reasoning (Table 5). Introduction to Computer Science I, Informal Geometry and Calculus, all clearly required some form of problem solving, but the exact nature of that problem solving was either unclear from the syllabus as in the final paper for Informal Geometry, and group work expected in Calculus, or may even represent a distinct set of problem solving skills from those associated with inquiry and analysis, or quantitative reasoning such as the programming and debugging required in Introduction to Computer Science I. As has been suggested from the LA&S assessment data, there are a number of LA&S courses with a strong emphasis on problem solving through inquiry and analysis, but other forms of problem solving such as quantitative reasoning are more variable in their expression across the SMT cluster.

In terms of other learning outcomes, Reading, Writing and Oral Communication are all expressed in some of the SMT cluster course syllabi examined. However, there is a great deal of variability across these courses in terms of their representation. Civic engagement, ethical reasoning and information literacy were not observed in any of the syllabi, and citizenship appeared only in terms of human relationships with our planet in Earth Systems Science. The only other learning outcome that was suggested as a possibility for some of our SMT courses was aesthetic appreciation. While none of the syllabi explicitly referenced aesthetic appreciation it was suggested that some of our math courses, particularly informal geometry focus on the aesthetics of mathematics implicitly. However, the greatest potential for learning outcomes in the SMT cluster continue to be in the areas of problem solving through inquiry, analysis and quantitative reasoning.

Liberal Arts and Sciences Selected Syllabus Analysis:
Table 4: Science Technology and Mathematics Cluster (with a potential focus on inquiry and analysis)

Objectives	EXSS 1000 Health and Fitness	GEOG 1000 Earth Systems Science	CHEM 1300 General Chemistry I	BIOL 1800 General Biology II	MATH 1800 Business Statistics	Math 1700 Statistics
Communication						
Reading	Read chpt, chpt quizzes	Reading "1-4-1" Incliudes strategies and assessment			Mastery of course work takes less effort if you keep well-organized notes, read your notes and appropriate sections in the textbook before and after each class. 10% Reading Assignments And Projects and Top Hat	You are responsible for learning all assigned material not covered in class by studying the textbook
Writing	Keep log; write reports	…with the objective of improving student skills in: Written and Oral Communication of science concepts.		…be able to […] **write a**n intelligent, cohesive lab report based on those experiments.	Minimally Mentioned in The assignments Section "Writing assignments will be given from time to time."	

Oral Communication		…with the objective of improving student skills in: Written and Oral Communication of science concepts.				Discussion
Civic Engagement						
Citizenship		…with the objective of improving student skills in: Global Citizenship (as it pertains to the human relationship with our planet.				
Ethical Reasoning						
Problem Solving		…with the objective of improving student skills in: Problem Solving (both quantitative and analytical).	To learn and improve **analytical problem solving skills**.	Students will be able to work within a group to **develop a strategies and solutions** for answering a scientific questions related to a course topic"	"Basic concepts, and terms will be introduced so that students will be acquainted with many uses (and abuses) of statistics in today's society; furthermore students will be	There is a large data project explained in the syllabus.

					familiar with statistical producers as to be better able to analyze and interpret published materials that use statistics.	
Critical Thinking				"Students will be able to **think critically about** biological concepts and relate them to real-world situations" (lecture)		
Inquiry and Analysis		See above "both quantitative and analytical."	To learn and improve **analytical problem solving skills**.	"You will also be able to **design experiments** and write an intelligent, cohesive lab report based on those experiments"	See above, "analyze and interpret published materials that use statistics."	See above, assumed to be part of data project.
Quantitative Reasoning		See above "both quantitative and analytical."			See above, "acquainted with many uses (and	See above, assumed to be part of data

					abuses) of statistics in today's society"	project.
Information Literacy						
Aesthetic Appreciation						

Table 5: Science Math and Technology cluster courses (lacking an emphasis on inquiry and analysis)

Objectives	CSC 1500 Computer Science I	MATH 2000 Informal Geometry	MATH 2300 Calculus I
Communication			
Reading	Ability to read the Text and understand the concepts is crucial because learning will have to continue outside the classroom and even after graduation.		
Writing		There is a large section in the syllabus about writing, quality of writing and what it means to write mathematically.	
Oral Communication			There is group work involved in the class and asking questions is encouraged more than once in the syllabus.
Civic Engagement			
Citizenship			

Ethical Reasoning			
Problem Solving	Students will have understood the basic structure of programming and written and debugged several programs.	There is a final paper listed in the syllabus and it can be inferred that problem solving is covered solidly, but only in an implicit manner.	This is a mathematics class and Problem Solving is covered solidly but only in an implicit manner.
Critical Thinking			
Inquiry and Analysis			
Quantitative Reasoning			
Information Literacy			
Aesthetic Appreciation		Aesthetic Appreciation is also covered implicitly in that teaching mathematics, they try to instill a notion of the beauty of mathematics and this course (geometry) lends itself well to this.	Aesthetic Appreciation is also covered implicitly in that teaching mathematics, they try to instill a notion of the beauty of mathematics.