4.0 Student Learning Outcomes and Assessment Plan

Note: You are strongly encouraged to work with the University Assessment Coordinator (977-4189 or thatcherk@slu.edu) as you develop this portion of the proposal. The University Assessment Coordinator can help you establish appropriate student learning outcomes, methods for measuring student progress and using the data to inform program improvement, and assist with all facets of academic assessment.

4.1 Student Learning Outcomes Assessment Plan

Complete the table below to provide an overview of your plan to assess student progress toward achievement of desired program-level learning outcomes. Note that results of evaluations of student performance against each learning outcome identified below will be reviewed as part of all college/school/center-level and University-level program reviews.

Program-Level Student Learning Outcomes *What are the most important (no more than five) specific learning outcomes you intend for all program completers to be able to achieve and demonstrate upon completion of the program?*	**Evaluation Method** *How will students document/demonstrate their performance toward achievement of the learning outcomes? How will you measure student performance toward achievement of the learning outcomes?* *Describe any use of direct measures: capstone experiences/courses, standardized exams, comprehensive exams, dissertations, licensure exams, locally developed exams, portfolio reviews, course-embedded assessments, etc.* *Describe any use of indirect measures: student, alumni or employer surveys (including satisfaction surveys); exit interviews/focus groups with grads; retention/transfer studies; graduation rates; job placement/grad school admission rates; etc.*	**Use of Assessment Data** *How and when will student performance data be analyzed and then used to "close the assessment loop" and inform **program improvement**? How will you document that?*
EXAMPLE: 1. *Demonstrate a thorough understanding of ethical problems being addressed in an individual case or class of cases.*	***EXAMPLE:*** ***Direct Measures:*** 1. *The following courses in the program specifically require formal case analyses designed to elicit direct evidence of student development toward this outcome: BUS 500, BUS 522, BUS 600* 2. *Embedded in the mid-term and final exams in certain required courses (BUS 550, MGMT 503, BUS 650) will be questions designed specifically to provide data enabling faculty and program administrators to evaluate student progress toward this outcome.* ***Indirect Measures*** 1. *End-of-course student surveys will solicit self-evaluations of their development in the context of this outcome.* 2. *Alumni surveys (administered one and five post-graduation) will solicit from graduates self-evaluations of their continued development in the context of this outcome, and will particularly focus on how the program has impacted professional competency.*	***EXAMPLE:*** *Assessment results will be analyzed annually against a standard rubric by the program director and a small team of faculty; recommendations for curriculum, pedagogy and/or assessment revisions will be made to the department faculty on an annual cycle that allows for appropriate implementation.* *Reviews of the impact of any such program changes will also be conducted annually, and the records of those reviews will be maintained by our department assessment coordinator.*
1. Graduates will use programming and other computer science skills to analyze and interact with data. (**CS**)	**Direct Measures:** The two semester capstone experience (DATA 4961/4962), the data science practica (DATA 1800/2800) and a course project in CSCI 4750 will be used to assess students' computer science skills. **Indirect Measures:** *Exit interviews for all graduates will contain a self-assessment of their development of this outcome. Post-graduate surveys (one and three years out) will ask for a self-assessment of their continued development.*	*Assessment results will be reviewed annually and analyzed as sufficient data becomes available. Subjective evaluations of faculty members serving as mentors to capstone projects and in practica will be recorded. Course assignments will be graded against a rubric, and recommendations for changes will be made to faculty teaching data science courses as sufficient data becomes available.* *Reviews of the impact of any such changes will be conducted after two and five years,*

		the results of which will be maintained by the program director.
2. Graduates will apply statistics to analyze data sets. (**STAT)**	**Direct Measures:** The two semester capstone experience (DATA 4961/4962), the data science practica (DATA 1800/2800) and a course project in STAT 4870 will be used to assess students' understanding of statistics necessary for data science. **Indirect Measures:** *Exit interviews for all graduates will contain a self-assessment of their development of this outcome. Post-graduate surveys (one and three years out) will ask for a self-assessment of their continued development.*	*Assessment results will be reviewed annually and analyzed as sufficient data becomes available. Subjective evaluations of faculty members serving as mentors to capstone projects and in practica will be recorded. Course assignments will be graded against a rubric, and recommendations for changes will be made to faculty teaching data science courses as sufficient data becomes available.* *Reviews of the impact of any such changes will be conducted after two and five years, the results of which will be maintained by the program director.*
3. Graduates will be able to acquire and manage complex data sets. (**DATA)**	**Direct Measures:** The two semester capstone experience (DATA 4961/4962), the data science practica (DATA 1800/2800) and course projects in CSCI 4750 and STAT 4870 will be used to assess students' ability to acquire and manage complex data sets. **Indirect Measures:** *Exit interviews for all graduates will contain a self-assessment of their development of this outcome. Post-graduate surveys (one and three years out) will ask for a self-assessment of their continued development.*	*Assessment results will be reviewed annually and analyzed as sufficient data becomes available. Subjective evaluations of faculty members serving as mentors to capstone projects and in practica will be recorded. Course assignments will be graded against a rubric, and recommendations for changes will be made to faculty teaching data science courses as sufficient data becomes available.* *Reviews of the impact of any such changes will be conducted after two and five years, the results of which will be maintained by the program director.*
4. Graduates will be able to use technical skills in predictive modeling. (**PREDICT)**	**Direct Measures:** Projects in CSCI 4750 and STAT 4870 will be used to assess student's technical skills in predictive modeling. **Indirect Measures:** *Exit interviews for all graduates will contain a self-assessment of their development of this outcome. Post-graduate surveys (one and three years out) will ask for a self-assessment of their continued development.*	*Assessment results will be reviewed annually and analyzed as sufficient data becomes available. Subjective evaluations of faculty members serving as mentors to capstone projects and in practica will be recorded. Course assignments will be graded against a rubric, and recommendations for changes will be made to faculty teaching data science courses as sufficient data becomes available.* *Reviews of the impact of any such changes will be conducted after two and five years, the results of which will be maintained by the program director.*

5. Graduates will be able to visualize data to facilitate the effective presentation of data-driven insights. (**VIZ)**	**Direct Measures:** The two semester capstone experience (DATA 4961/4962), the data science practica (DATA 1800/2800) will be used to assess students' presentation skills. **Indirect Measures:** *Exit interviews for all graduates will contain a self-assessment of their development of this outcome. Post-graduate surveys (one and three years out) will ask for a self-assessment of their continued development*	*Assessment results will be reviewed annually and analyzed as sufficient data becomes available. Subjective evaluations of faculty members serving as mentors to capstone projects and in practica will be recorded. Course assignments will be graded against a rubric, and recommendations for changes will be made to faculty teaching data science courses as sufficient data becomes available.* *Reviews of the impact of any such changes will be conducted after two and five years, the results of which will be maintained by the program director.*

4.2 Curriculum Mapping

Courses should contribute to student achievement of the program learning outcomes detailed above. Sequencing should be intentional and complementary, allowing for the development of curricular content at multiple levels and the application and demonstration of student understanding and skills at multiple levels. Accordingly, complete the two curriculum maps below, indicating the course(s) in which each learning outcome is intentionally addressed and at particular levels of intellectual complexity and rigor, using the level indicators* provided below. ***Depending on the nature of the proposed program, the levels may seem more or less appropriate. Without veering from the spirit of the exercise, you may adapt the levels as deemed appropriate.***

Level I	Level II	Level III
▪ *Necessary Prerequisites:* Perform the skills that will be required for learning an outcome, but aren't strictly part of the outcome. ▪ *Knowledge:* Understand the elementary ideas and first examples of an outcome.	▪ *Application:* Use a concept in new situations; unprompted use of an abstraction. Application of knowledge in novel situations. ▪ *Analysis:* Separates material or concepts into component parts so organizational structure may be understood. Distinguishes facts from inferences.	▪ *Synthesis:* Builds a structure or pattern from diverse elements. Put parts together to form a whole, with emphasis on creating a new meaning or structure. ▪ *Evaluation:* Make judgments about the value of ideas or materials.

Note: *When you first complete the curriculum maps, you may see that certain outcomes are not addressed in any developmentally-appropriate sequence, or that a particular outcome might not be addressed substantially enough; you might even see that you have included a course(s) in your curriculum that doesn't substantially contribute to the development of* any *outcome. You should use the map to alter your program design, course syllabi and course sequencing to best facilitate and support student achievement of the outcomes. The result of that exercise should be a final curriculum map presented below when you submit your proposal to UAAC.*

Courses Offered by Home Department of Proposed Major or Minor:

Major or Minor Student Learning Outcomes	CSCI 1070	CSCI 1300	CSCI 2100	CSCI 2300	CSCI 3100	CSCI 3300	CSCI 3710	CSCI 3760	CSCI 4750	CSCI 4850
Example: Outcome #1	***3***	***1***	***1, 2***	***2***		***2***	***2***		***1***	***3***
Outcome 1 **CS**	1	*1*	*2*	*2*	*2*	*3*	*3*	*3*	*2*	*2*
Outcome 2 **STAT**	1								*1*	
Outcome 3 **DATA**	*1*	*1*	*1*	*1*	*1*	*1*	*2*		*3*	*2*
Outcome 4 **PREDICT**	*1*							*1*	*3*	
Outcome 5 **VIZ**	*1*									

Major or Minor Student Learning Outcomes	MATH 1510	MATH 1520	MATH 1660	MATH 2530	MATH 3110/ 3120	STAT 3850	STAT 4800	STAT 4840	STAT 4850	STAT 4860	STAT 4870
Example: Outcome #1	***3***	***2***	***2, 3***	***1***	***1***	***1, 2***	***2***		***2***		***2***
Outcome 1 **CS**			1			1	1	1	1	1	1
Outcome 2 **STAT**	*1*	*1*	*1*	1	1	2	2	2	3	3	3
Outcome 3 **DATA**			*1*			*1*		*1*		*1*	*3*
Outcome 4 **PREDICT**	*1*	*1*		*1*	*1*	*1*	*1*	*3*	*2*	*1*	*3*
Outcome 5 **VIZ**						*1*		*1*	*1*		*1*

Major or Minor Student Learning Outcomes	STAT 4880	DATA 1800	DATA 2800	DATA 4961	DATA 4962
Example: Outcome #1		***3***	***2***	***1***	***1, 2***
Outcome 1 **CS**	1	1	1	*3*	*3*
Outcome 2 **STAT**	3			*3*	*3*
Outcome 3 **DATA**	*2*	*1*	*2*		
Outcome 4 **PREDICT**	*3*	*1*	*2*		
Outcome 5 **VIZ**		*1*	*2*	*3*	*3*

* Adapted from Bloom's Taxonomy (1965)