

Data Science | 2016-2017 Assessment Report

1. Please give a brief overview of the assessment data you collected this year.

1. MSDS program has seven program learning goals (PLG):

The MSDS students will be able to:

PLG A: identify and assess the needs of an organization for a data science task

PLG B: collect and manage data to devise solutions to data science tasks

PLG C: select, apply, and evaluate models to devise solutions to data science tasks

PLG D: interpret data science analysis outcomes

PLG E: effectively communicate data science related information effectively in various formats to appropriate audiences

PLG F: value and safeguard the ethical use of data in all aspects of their profession PLG G: transform findings from data resources into actionable business strategies

2. Assessment Committee (2016-2017)

Amy Kuether (UWEX)
Gaurav Bansal (UWGB)
Jeffrey Baggett (UW Lacrosse)
Ethan Christensen (UW Superior)
Robert Dollinger (UW Stevens Point)
Erik Krohn (UW Oshkosh)
Alex Smith (UW Eau Claire)

3. Assessment plan

MSDS Assessment committee decided to assess all the program learning goals for the year 2016-2017. the program learning goal (PLG C) for the year 2015-2016. The assessment was carried out in two courses: DS 715 and DS 730 in Spring 2016 using embedded class assessments. We assessed the following two traits of PLG C: (i) Students will be able to choose and apply tools and methodologies to solve data science tasks (DS 730), and (ii) Students will be able to assess the model used to solve data science tasks (DS 715).

4. Summary of the assessment:

We assessed the following seven traits:

Course Learning Objective Code (Traits)	- · · · · · · · · · · · · · · · · · · ·	Course Assessed	Semester Assessed
	Students will be able to conduct a needs assessment.	DS700	Fall 2016

A2	Students will be able to frame tasks in the context of organizational goals.	DS700	Fall 2016
C7	Choose and apply tools and methodologies to solve data science tasks	DS700	Fall 2016
F14	Identify and analyze social, legal, and ethical issues associated with the recommendations provided.	DS700	Fall 2016
C6	Identify and classify relevant variables for data science tasks	DS745	Spring 2017
C7	Choose and apply tools and methodologies to solve data science tasks	DS745	Spring 2017
D9	Interpret data, extract meaningful information, and assess findings	DS745	Spring 2017
E12	Help non-technical professionals visualize, explore, and act on data science findings	DS745	Spring 2017

Performance of students:

	DS700	DS700	DS700	DS700	DS745	DS745	DS745	DS745	DS760
	Fall	Fall	Fall	Fall	Spring	Spring	Spring	Spring	Spring
	2016	2016	2016	2016	2017	2017	2017	2017	2017
	A1	A2	C7	F14	C6	C7	D9	E12	F14
	Need	Frame	Tools	Ethics	Variables	Tools	Interpret	Act	Ethics
Marks	Assessment	Task	10013	LUIICS	variables	10015	interpret	ACI	LUIICS
90% and	41	50	38	27	11	11	14	10	10
above	41	30	36	27	11	11	17	10	10
80 to 90%	27	17	30	17	2	6	3	5	3
70 to 80%	5	6	5	11	4	0	0	3	1
60 to 70%	1	1	1	17	1	0	1	1	0
Less than 60	3	3	3	5	4	5	2	3	0
# of students	77	77	77	77	22	22	20	22	14

DS 700: There were 77 students who were assessed. Two students got incomplete and hence couldn't be assessed. Out of 77, 23 students got less than 60% in ethics. Also, out of 77, four students got less than 60% for need assessment, frame task and tool selection.

DS 745: Comments: There were 22 students who were assessed. Two students couldn't be assessed for the first learning goal. Out of 22, five students got less than 60% for "Choose and apply tools and methodologies to solve data science tasks".

DS 760 Comments: The instructor believes that the class did very well in satisfying the selected learning outcome. By the end of the course students have had a lot of practice analyzing

ethical issues in data science and it shows. The student who received less than 80% on the rubric item was not a strong writer, which meant that he needed to put a lot of effort into this assignment. (Instructor believes that he was capable of receiving a 40 or better out of 50 on this rubric item, but that he did not put in the effort required of him.) Note, also, that compared to the assessment done during the Fall (2016) semester, it appears that students are succeeding in this learning outcome at a higher rate.

Assessment Method

DS 700

Method of assessment: Case study

Data was collected by examining the performance of all the students enrolled on the course in their case study report. All students were required to submit a case study report, and it was an individual assignment. Previously it be used to be a group project (Spring 2016 and before), however it was felt that the students are dividing the work, and hence each student is learning only one component of the case study and not all. Hence this time we converted the case study into an individual assignment, and provided students additional help so that they can complete the entire case study individually.

DS 745

Method of assessment: three projects.

Data was collected by examining the performance of all the students enrolled in the course in three different projects: visualization, network analysis and text mining. All students were required to submit a report for each of the project. All the projects were individual assignments. We arrived at the assessment data by averaging the grades obtained by a student for each learning objective across the three projects. Refer to the Appendix B for the rubrics used for DS 745 assessment.

DS 760

Method of Assessment: Final Project

Examples: The final project is a paper with a very specific format. For the paper, the student selects a current topic related to ethics in data science. This topic is to be chosen from among all the topics presented by members of the class in video presentations (due earlier). The paper must specifically analyze an ethical issue by taking an ethical point of view that emphasizes equality, justice, and respect, applying existing policies and conventions (including any laws), contemplating what one or more ethical theories might conclude, and consulting at least one relevant professional code of ethics. The assignment requires that the student also consider at least one point of view that is contrary to her own with regard to the ethical issue under consideration. The student must make the case that while she understands the alternative point of view, there are strong reasons for favoring her own. The project therefore offers a very strong platform for showing mastery of Outcome #16: Students will be able to identify and analyze social, legal, and ethical issues in data science.

Results: Of the 14 students in the course who submitted a final project, all of the students enrolled except for one received at least a 40/50 (or 80%) on the rubric item that reads:

Show a nuanced understanding of ethical dimensions through a strong analysis which (1) incorporates ethical frameworks, code of ethics, and other systematic analysis techniques to lay out two alternative views; and (2) defends one of them.

2. How will you use what you've learned from the data that was collected?

As we are just getting the program up and going there are many gaps in measures and results. This is a work in progress. Most of the CLOs are being covered in multiple courses. Several of the gaps correspond to courses that are being piloted during 2016-17.

An important task for MSDS assessment committee for 2017-2018 will be to put a comprehensive assessment plan in place to start assessing most of the PLG, and also to take corrective action based on the results from 2016-2017 assessment data.

In preparing to report on our current assessment plan we've realized a few shortcomings:

- o The learning outcomes are too granular and frequently overlapping. We will be work to simplify the learning outcomes and curriculum map in Summer 2017.
- The curriculum map needs to distinguish between introducing, continuing coverage, and assessment of learning outcomes. Not every one of the outcomes will be assessed in every class. We hope to add this to the simplified curriculum map in Summer 2017.
- o Right now the assessment plan is essentially to ensure that every course includes assessment of at least some of its corresponding learning outcomes. So every course incudes assessment, but not every learning outcome is being assessed somewhere. We will be working to address this during the 2017-18 year.
- Each instructor is called upon to complete an assessment report for their course, but the template for these reports isn't sufficiently detailed so that the task and rubric are not always reported.

Appendix A

Master of Science in Data Science - Program Level Learning Goals & Course Mapping 0 0 1 1 1 2 1 0 1 0 1 0 1 0 1 0 1 0 1 0	Midaster of Science in Data Science - Program Level Learning Goals & Course Mapping 0 1 1 1 2 1 2 1 7 1 7 1 7 1 7 1 7 1 7 7 7 7	7	<	20	د	-		_	9	_ _	-	~	_	Σ	z
Students will be able to Ledentify and assess the needs of an organization for a data science task.	Students will be able to Jedentify and assessment. Students will be able to Jedentify and assessment. Students will be able to Jedentify and assessment. Students will be able to collect and manage data to devide colditions to data science tasks. Students will be able to collect and manage data to devide colditions to data science tasks. Students will be able to collect and manage data to devide colditions to data science tasks. Students will be able to collect and manage data to devide colditions to data science tasks. Students will be able to collect and the student of the science tasks. Students will be able to collect and the science tasks. Students will be able to collect and the science tasks. Students will be able to collect and the science tasks. Students will be able to collect and task to data science tasks. Students will be able to collect and task to data science tasks. Students will be able to collect and task to data science tasks. Students will be able to collect and task to data science tasks. Students will be able to collect and task to data science tasks. Students will be able to collect and task to data science tasks. Students will be able to collect and task to data science tasks to data science findings. Students will be able to collect and the science task to data science tasks to data science findings. Students will be able to devide and and postable task and the able to will be able to devide and and postable task a	-		Master of Science in Data Science - Program Level Learning Goals & Course Mapping	0 0	20 ~	~-0	r~ rο	~ e o	~ ₩ W	⊱ 4 R	~ 9 0	~ ~ 5	~ ∞ 0	~ ∞ v
Solubers will be able to conduct streets sessesment. Solubers will be able to conduct streets sessesment. Solubers will be able to conduct streets selected and manage data to devise solutions to data science tasts. Solubers will be able to collected and manage data to devise solutions to data science tasts. Solubers will be able to collected and manage data to devise solutions to data science tasts. Solubers will be able to collected data science tasts and because the manage data to devise solutions to data science tasts. Solubers will be able to collected data science tasts. Solubers will be able to collected and manage data to devise solutions to data science tasts. Solubers will be able to collected and manage data to devise solutions to data science tasts. Solubers will be able to collected and personal personal data science tasts. Solubers will be able to collected and specification and sesses findings. Solubers will be able to collected and specification and sesses findings. Solubers will be able to collected and specification and science findings. Solubers will be able to collected and science findings. Solubers will be able to collected and science findings. Solubers will be able to collected and science findings. Solubers will be able to collected and science findings. Solubers will be able to collected data science findings. Solubers will be able to collected data science findings. Solubers will be able to collected data science findings. Solubers will be able to collected data science findings. Solubers will be able to collected data science findings. Solubers will be able to collected data science findings. Solubers will be able to collected data science findings. Solubers will be able to collected and science findings. Solubers will be able to collected data science findings. Solubers will be able to collected data science findings. Solubers will be able to collected data science finding and science findings and devise findings and developed p	Solutions to the able to conduct a need's sessessment.	- 01	~	Students will be able to_identify and assess the needs of an organization for a data science task.	-		仁	╁	╢	╀	_	Ļ		Ĺ	\vdash
2) Souchers will be able to certain design and manage clast to device solutions to data science tasks. 3) Souchers will be able to conforminate data science solutions to data science tasks. 4) Souchers will be able to conforminate data science solutions to data science tasks. 5) Souchers will be able to collect and manage clast to device solutions to data science tasks. 5) Souchers will be able to calculate data in manage clast to device solutions to data science tasks. 5) Souchers will be able to calculate data science analysis customers. 6) Souchers will be able to calculate data science analysis customers. 7) Souchers will be able to calculate data science analysis customers. 8) Souchers will be able to interpret data science analysis customers. 8) Souchers will be able to interpret data science analysis customers. 9) Souchers will be able to interpret data science tasks controlled. 9) Souchers will be able to interpret data science tasks controlled. 9) Souchers will be able to interpret data science tasks controlled. 9) Souchers will be able to interpret data science tasks controlled. 9) Souchers will be able to interpret data science tasks controlled. 9) Souchers will be able to interpret data science tasks controlled. 9) Souchers will be able to interpret data science tasks controlled. 9) Souchers will be able to interpret data science tasks controlled. 9) Souchers will be able to calculate the management of data science tasks controlled. 9) Souchers will be able to calculate the task controlled source data science tasks controlled. 9) Souchers will be able to calculate the task controlled source device the controlled source data science tasks controlled source device the	2) Students alle has he to farme tasks in the content of cognitional goals. 3) Students alle has he to farme tasks in the content of cognitional poals. 4) Students alle has he to committe delta science politicis to data science tasks. 5) Students will be able to collect, claim, and prepared data to devise solutions to data science tasks. 5) Students will be able to collect, claim, and prepared for some devise solutions to data science tasks. 5) Students will be able to collect claim, and prepared for solve data science tasks. 6) Students will be able to collect claim, and prepared for solve data science tasks. 7) Students will be able to collect claim, and prepared for science tasks. 8) Students will be able to collect claim, and prepared for science tasks. 9) Students will be able to collect claim, and prepared for science tasks. 9) Students will be able to collect claim, and prepared for science tasks. 9) Students will be able to collect claim, and prepared for science tasks. 9) Students will be able to collect claim, and prepared for science tasks. 9) Students will be able to collect claim, and prepared for science tasks. 9) Students will be able to collect claim, and prepared for science tasks. 9) Students will be able to collect claim, and science tasks. 9) Students will be able to collect claim, and science tasks science for an action of abas science for an action of abas science for an action of abas science for action of the s	62		(i) Students will be able to conduct a needs assessment.	×										
Students will be able to confect and manage data to device solutions to data science tasks. Students will be able to collect and manage data to device solutions to data science tasks. Students will be able to collect and manage data to device solutions to data science tasks. Students will be able to collect and manage data to device solutions to data science tasks. Students will be able to calculate the collect and manage data to device solutions to data science tasks. Students will be able to calculate the collect apply and evaluate models to device solutions to data science tasks. Students will be able to calculate the collect apply and evaluate models to device solutions to data science tasks. Students will be able to calculate the collect and the colle	8 Students will be able to connectivate data science ablorions to data science tasks. 5 Students will be able to connectivate data in manage data to device solutions to data science tasks. 5 Students will be able to collect tail manage data to device solutions to data science tasks. 5 Students will be able to collect class, and properties and page data to device solutions to data science tasks. 6 Students will be able to collect tail and manage data and evaluate models to design science tasks. 7 Students will be able to collect able to collect tasks. 8 Students will be able to collect task to collect tasks. 9 Students will be able to collect tasks science analysis contromers. 9 Students will be able to collect tasks science analysis contromers are retained information effectively in various formats to appropriate audiences. 9 Students will be able to collect tasks assistence analysis contromers and the collect tasks to collect tasks assistence analysis contromers and the collect tasks to collect tasks the collect tasks tasks to collect tasks to collect tasks the collect tasks to collect tasks the collect tasks tasks tasks tasks the collect tasks task	4		2) Students will be able to frame tasks in the context of organizational goals.	×					H					
Students will be able to collect, chean, and prepare data to devise solutions to data science tasts. Students will be able to collect, chean, and prepare data. Students will be able to collect, chean, and prepare data. Students will be able to collect, chean, and prepare data. Students will be able to collect, chean, and prepare data science tasts. Students will be able to choose and apply used and methodologies to solve data science tasts. Students will be able to choose and apply to chean and methodologies to solve data science tasts. Students will be able to choose and apply to chean and methodologies to solve data science tasts. Students will be able to choose and apply to chean and methodologies to solve data science tasts. Students will be able to choose and apply to chean and methodologies to solve data science tasts. Students will be able to choose and apply to chean and methodologies to solve data science tasts. Students will be able to charge and a science and apply to chean and methodologies to solve data science tasts. Students will be able to charge the model tast as science tasts. Students will be able to charge the model tast as science tasts. Students will be able to charge the model tast as science tasts. Students will be able to charge the model tast as science tasts. Students will be able to charge the model tast as science tasts. Students will be able to charge the model tast as science tasts. Students will be able to charge the model tast as science tasts. Students will be able to charge the and science tasts will be able to charge the and as a science tast and the data as science tasts. Students will be able to charge the advertical good feat and and as a science tast and the associated the advertical are of data in all aspects of their profession. Students will be able to charge the advertical good of tasts and an advertical are of data as a science tast and the associate that a resources into a actionable business strategies. Students will be	Students will be able to collect and manage data to devise softwices tasks. Students will be able to collect, clear, and prepare data. Students will be able to collect, clear, and prepare data. Students will be able to collect, clear, and revaluate that a final counter, clear, and revaluate data in the collect, clear, and revaluate that a final collect and methodologies to solve data science tasks. Students will be able to collect apply, and evaluate that science tasks. Students will be able to collect and methodologies to solve data science tasks. Students will be able to collect and methodologies to solve data science tasks. Students will be able to collect and methodologies to solve data science tasks. Students will be able to collect and methodologies to solve data science tasks. Students will be able to collect and the science tasks. Students will be able to collect and the science tasks. Students will be able to unitary command to solve data science related information effectively in various formats and science inflated information and science inflated inflated information and science inflated inflated information and science inflated inflated inflated inflated inflated inflated inflated inflated inflated	100		3) Students will be able to communicate data science options and limitations that could meet organizational needs.					-	-	_		×		
5 Students will be able to cerebate data in terms of source, volume, frequency, and flow. 5 Students will be able to caselect, apply and evaluate models to devise solutions to data science tasts. 5 Students will be able to caselect, apply and evaluate models to devise solutions to data science tasts. 7 Students will be able to caselect, apply and evaluate models to devise solutions to data science tasts. 8 Students will be able to caselect, apply and evaluate models solve the science tasts. 9 Students will be able to caselect, apply and accessed findings. 10 Students will be able to caselect and a science tasts. 10 Students will be able to caselect and a science tasts of the science findings. 10 Students will be able to caselect and a science tast accessed findings. 10 Students will be able to caselect and a science tast accessed findings. 10 Students will be able to caselect and a science tast accessed findings. 11 Students will be able to caselect and a science tast accessed findings. 12 Students will be able to caselect accessed findings. 13 Students will be able to caselect accessed findings. 14 Students will be able to caselect accessed findings. 15 Students will be able to caselect accessed findings. 16 Students will be able to caselect accessed findings. 17 Students will be able to caselect accessed findings. 18 Students will be able to caselect accessed findings. 18 Students will be able to caselect accessed findings from data a resources inda a science findings. 18 Students will be able to caselect and accessed findings from data a resources in find as science profession. 18 Students will be able to caselect accessed findings and acces	4) Students will be able to collect clear, and prepare data. 5] Students will be able to collect clear, apply, and evaluate data in terms of source, volume, frequency, and flow. 6] Students will be able to uselect, apply, and evaluate for the devise solutions to data science tasks. 7] Students will be able to devise solution and evaluate for data science tasks. 8] Students will be able to collect and a science tasks. 9] Students will be able to collect and a science tasks. 10] Students will be able to unknown that the data science tasks from the science tasks and tasks of the data science tasks. 11] Students will be able to unknown that the data science related information effectively in various format science. 12] Students will be able to unknown that the data science related information effectively in various formats of science analysis outcomes. 13] Students will be able to unknown that the data science related information effectively in various formats of science includes the data science includes and the data science related information effectively in various formats of science includes and the data science includes and the able to unknown that the data science includes and the able to unknown the data science includes and the able to unknown the data science includes and the able to unknown the data science includes and the able to unknown the data science includes and the able to unknown the analysis scoole (applied the able to the proper the activities and cloids of others within a relief in memory and determine an appropriate activities and cloids of others within a relief in memory and determine an appropriate activities and cloids of others within a relief in memory and determine an appropriate activities and cloids of others within a relief in memory and determine an appropriate activities and cloids of others within a relief in memory and a sessor sean be unkno		m	Students will be able to collect and manage data to devise solutions to data science tasks.				Н	├	┞	Ļ			İ	
Signature swill be able to cusedect, apply, and evaluate models to devise solutions to data science tasts. Signature swill be able to cusedect, apply, and evaluate models to devise solutions to data science tasts. Signature swill be able to cusedect, apply, and evaluate models to devise solutions to data science tasts. Signature swill be able to bidentify and classify relevant variables for data science tasts. Signature swill be able to bidentify and classify relevant variables for data science tasts. Signature swill be able to bidentify and classify relevant variables for data science tasts. Signature swill be able to bidentify and classify relevant variables for data science tasts. Signature swill be able to bidentify and classify relevant variables for data science tasts. Signature swill be able to bidentify and classify relevant variables for data science tasts and method of the science findings. Signature swill be able to bidentify and classify relevant variables for data science related information effectively in various formation. Signature swill be able to bidentify and analyse social bidentify and activate data variable. Signature swill be able to write, format disconting discourable was an organized to the control of the science findings. Signature swill be able to write, format discourable the ethical size of data in all aspects of their profession. Signature swill be able to bidentify and analyse social begal and echical science profession. Signature swill be able to bidentify and analyse social begal and echical science profession of social social profession of the science profession of social programmers and science profession of the science profession of social programmers and professional social programmers and science professional social programmers and science profession of social programmers and science professional social programmer	 S) Students will be able to caselect, apply, and evaluate models to devise solutions to data science tasks. S) Students will be able to caselect, apply, and evaluate models to devise solutions to data science tasks. S) Students will be able to identify and classify relevant variables for data science tasks. S) Students will be able to caselect apply, and evaluate models to devise solvene tasks. S) Students will be able to assess the model uped to solve data science tasks. S) Students will be able to interpret data errant meaningful information and assess findings. S) Students will be able to interpret data errant meaningful information and assess findings. S) Students will be able to evaluate the imhalmont and assess findings. S) Students will be able to interpret data errant meaningful information and assess findings. S) Students will be able to evaluate the imhalmont and assess findings. S) Students will be able to evaluate the imhalmont and assess findings. S) Students will be able to evaluate the imhalmont data science related information effectively in various formatic and assess findings. S) Students will be able to evaluate the imhalmont of all science related information effectively in various formatic and assessed on a science related information and science and assistence findings. S) Students will be able to evaluate and assistence findings. S) Students will be able to interpret the abovilers and choices of others within an enhanced and assistence that a interpret the abovilers and choices of others within an enhanced mention of a students will be able to interpret the abovilers and choices of others will in a specietor and an enhanced mention of a students will be able to interpret the abovilers and choices of others will an enhanced to develop competitive abovance and appraise the haborities and choices of others will in an enhanced to develop competitive abovance a	r-		4) Students will be able to collect, clean, and prepare data.			_	×	Н	×					
Structurers will be able to iscensive and dissisty relevant variables for data science tasks. Structurers will be able to iscensive and dissisty relevant variables for data science tasks. Structurers will be able to increpted data science tasks. Structurers will be able to concess and apply tools and methodologies to solve data science tasks. Structurers will be able to assess the model used to solve data science tasks. Structurers will be able to interpret data, extra extract meaningful information, and assess findings. Structurers will be able to interpret data, extra extract meaningful information effectively in various formats outlines and interpret data, extract meaningful information effectively in various formats outlines. Structurers will be able to interpret data, extract meaningful information effectively in various formats outlines. Structurers will be able to interpret data, extract meaningful information effectively in various formats of the activities and or only as science findings. Structurers will be able to unit format, disseminate, and or only as science findings. Structurers will be able to unit format dissemination effectively in an entire of data in all aspects of their profession. Structurers will be able to invergent and spot a professional code of ethics relevant to the data science profession. Structurers will be able to invergent that apply a professional code of ethics relevant to the data science profession. Structurers will be able to interpret data science expalsitives into the formation of a structurer will be able to interpret the activities and choices of others within an ethical farmer end the activities and choices of others within an ethical farmer end apply a professional code of ethics relevant to the data science profession findings from data asserts can be used to develop competitive advantage. Structurers will be able to explain how data asserts can be used to develop competitive a learn of data science professional structurers will be able	Students will be able to asset the model used to sevience tasks. Subders will be able to checked a science tasks. Subders will be able to checked a science tasks. Subders will be able to checked a science tasks. Subders will be able to checked a science tasks. Subders will be able to checked a science tasks. Subders will be able to checked a science tasks. Subders will be able to checked a science tasks. Subders will be able to checked tasks a science tasks. Subders will be able to checked tasks a science tasks. Subders will be able to checked tasks a science tasks. Subders will be able to checked tasks a science tasks. Subders will be able to checked tasks a science tasks. Subders will be able to checked tasks a science tasks and the science findings. Subders will be able to which come and science tasks and and das science findings. Subders will be able to with come discernation and access findings. Subders will be able to with come discernation and access findings. Subders will be able to with come discernation and access findings. Subders will be able to with come discernation and access findings. Subders will be able to interpret and access the exhibition and access findings. Subders will be able to interpret and access for the science of data in all aspects of their profession. Subders will be able to interpret and access for the science of data in all aspects of their profession. Subders will be able to interpret and accidence and science and choices of others similar and evidence and science and choices of others similar and evidence and accidence and choices of others similar and evidence and science capabilities into the formation of actual accidence professional condens will be able to interpret the activities and choices of others similar and evidence and science acquarations and the able to interpret the activities and choices of others similar and accidence and accidence and accidence and the accidence and the accidence and the accidence acquarations an			5) Students will be able to evaluate data in terms of source, volume, frequency, and flow.				_	×	×					
8) Students will be able to classify relevant vaitables for data solence tasts. 7) Students will be able to choose and apply tools and methodologies to solve data solence tasts. 8) Students will be able to concease and apply tools and methodologies to solve data solence tasts. 9) Students will be able to concease and apply tools and methodologies to solve data solence tasts. 9) Students will be able to concease the model used to selecte analysis outcomes. 9) Students will be able to evaluate the firmitations of data solence findings. 10) Students will be able to evaluate the firmitations of data solence findings. 11) Students will be able to evaluate the firmitations of data solence findings. 12) Students will be able to evaluate the firmitations of data solence findings. 13) Students will be able to write format, disseminate and orally communicate the chirical materials. 14) Students will be able to united the able to united assertional solends from the data solence findings. 15) Students will be able to united the chirical solence in the data solence profession. 16) Students will be able to united the able to united the chirical solence in the data solence profession. 17) Students will be able to united the able to united the chirical solence in the data solence profession of the data solence profession and solence in the data solence profession and solence and application of a situation and determine an appropriate address or professional conder of ethics relevant to the data solence profession and solence and application of a situation and all solences will be able to united the able to united the able to united the solence orange deliberation of a situation and detains and the able to english them data asserts can be used to develop competitive abbants will be able to english them data asserts can be used to develop competitive abbant and apparate the basis of the page to originate data asserts can be used to develop competitive abbant and analogement shills and management shill are abbant to identify and	6) Students will be able to identify and classify relevant valiables for data solence tasks. 7) Students will be able to choose and apply tools and methodologist to solbve data solence tasks. 8) Students will be able to concern and apply tools and methodologist to solbve data solence tasks. 9) Students will be able to interpret data, extract meaningful information, and assess findings. 8) Students will be able to interpret data, extract meaningful information, and assess findings. 8) Students will be able to evaluate the limit airons of data solence findings. 8) Students will be able to evaluate the limit airons of data solence findings. 8) Students will be able to one the communicate data solence findings. 8) Students will be able to one the communicate data solence findings. 8) Students will be able to one the communicate technical materials. 8) Students will be able to one the communicate technical materials. 8) Students will be able to be obtained and sate solence findings from data solence findings. 8) Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action of strudents will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action of strudents will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action of strudents will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate solund and apparate the able to interpret the activities and choices of others within an ethical framework and determine an appropriate action of a strudent of ethics of the action of a strudent of the action of a strudent of the action of the strudents will be able to interpret the activities and choices of others within an ethical fra	0	ပ	Students will be able to_select, apply, and evaluate models to devise solutions to data science tasks.				├	├	┞	Ļ			İ	
7) Students will be able to choose and apply tools and methodologies to solve data science tasks. 8) Students will be able to choose and apply tools and methodologies to solve data science tasks. 8) Students will be able to chiefective data, extract meaningful information, and assess findings. 8) Students will be able to chiefective data, extract meaningful information, and assess findings. 8) Students will be able to determine the imministrate reducing materials. 8) Students will be able to determine the imministrate reducing data science findings. 8) Students will be able to determine and science related information effectively in various formats to appropriate audiences. 8) Students will be able to determine and crail your municipate reducing data science findings. 8) Students will be able to chief science findings. 8) Students will be able to chief science and assistance findings. 8) Students will be able to chief science and science related in determine and science findings. 8) Students will be able to chief science and science findings. 8) Students will be able to whether and apply appreciation the ethicial issue of data in all aspects of their profession. 8) Students will be able to interpret the advivinge and choices of chiefs relevant to the data science profession. 8) Students will be able to interpret the advivinge and choices of chiefs relevant to the data science applicities into the formation of a situation analysis. 8) Students will be able to interpret the advivinge and choices of chees with an ethical framework and determine an appropriate advisation and against an equal professional covered into a situation analysis. 8) Students will be able to englain how data assets can be used to develop competitive advantage. 8) Students will be able to englain how data assets can be used to develop competitive advantage. 8) Students will be able to independ the advantage and assets can be used to develop competitive advantage. 8) Students will be able to independ the advantage and the e	7) Students will be able to choose and apply tools and methodologies to solve data science tasks. 8) Students will be able to assess the model used to solve data science analysis outcomes. 9) Students will be able to assess the model used to solve data science enalysis outcomes. 10) Students will be able to evaluate the limitations of data science enalysis controlled. 11) Students will be able to evaluate the limitations of data science enalysis controlled. 12) Students will be able to evaluate the limitations of data science enalysis on data science findings. 13) Students will be able to evaluate the limitations of data science enalysis on the science findings. 14) Students will be able to evaluate and safeguard the ethical use of data in all aspects of their profession. 15) Students will be able to evaluate and safeguard the ethical use of data in all aspects of their profession. 16) Students will be able to evaluate and safeguard the ethical use of ethics relevant to the data science profession. 17) Students will be able to use the safe to interpret the activities and choices of others within an ethical framework and determine an appropriate action based to interpret the activities and choices of others within an ethical framework and determine an appropriate action able to be integrated and apply a professional code of ethics relevant to the data science profession. 17) Students will be able to integrate the activities and choices of others within an ethical framework and determine an appropriate action able to explain from data resources into actionable business strategies. 18) Students will be able to equally appreciate the backership and management stillsrequired to direct a team of data science professional condents will be able to identify and appraise the leadership and management stillsrequired to direct a team of data science professional condents will be able to identify and appraise the leadership and management stillsrequired to direct a team of data science profession and the ethical	0		(S) Students will be able to identify and classify relevant variables for data science tasks.		×		×		×	-		×		
8) Students will be able to interpret data science tanksis. 10 Students will be able to interpret data science analysis outcomes. 11 Students will be able to interpret data science indings. 12 Students will be able to evaluate the immaintors of data science indings. 13 Students will be able to evaluate the immaintors of data science indings. 14 Students will be able to evaluate the immaintors of data science indings. 15 Students will be able to evaluate the immaintors of data in all aspects of their professional conduction and acceptance indings. 16 Students will be able to call and analyze social, legal, and ethicial trace of data in all aspects of their professional conduction. 18 Students will be able to interpret the activities and science of others within an ethicial framework and determine an appropriate action of state and choices of others within an ethicial framework and determine an appropriate action of astraction analysis. 19 Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action of a situation of a situation analysis. 19 Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action of the copy and the activities and choices of others within an ethical framework and determine an appropriate activities and data are sources into actionable business strategies. 19 Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate activities and choices of others within an ethical framework and determine and appropriate activities and choices of others within an ethical framework and determine and appropriate activities and choices of others within an ethical framework and determine and appropriate activities and choices of others within an ethical framework and determine and appropriate activities and be to identify and appraise the leadership and management skill are actived to develop c	8) Students will be able to assess the model used to solve data science tasks. 10) Students will be able to interpret data science analysis outcomes. 11) Students will be able to evaluate the limitations of data science related information effectively in various formats to appropriate audiences. 12) Students will be able to evaluate the limitations of data science related information effectively in various formats to appropriate audiences. 12) Students will be able to effectively communicate etchnical materials. 13) Students will be able to facilitate data-information and serious materials. 14) Students will be able to facilitate data-information and presenting questioning and presenting. 15) Students will be able to facilitate data-information data science findings. 16) Students will be able to facilitate data-information data in all aspects of their profession. 17) Students will be able to facilitate data-information data in all aspects of their profession. 18) Students will be able to identify and analyse social legal, and ethical issues in data science. 19) Students will be able to interpret the activities and choles of others within an ethical farmework and determine an appropriate action based on standards of professional code of ethics relevant to the data science profession in fine paths to interpret the activities and choles of others within an ethical farmework and determine an appropriate activities and applies from data resources into activities and others of the ethical profession in the able to develop competitive advantage. 17) Students will be able to identify and appraise the leadership and management still screquired to direct a team of data science papellines into the formation of a students will be able to identify and appraise the leadership and management still screduired to direct a team of data science professional goals.	-		7) Students will be able to choose and apply tools and methodologies to solve data science tasks.	×				~	×	_				
Students will be able to interpret data science analysis outcomes. Students will be able to interpret data science analysis outcomes. Students will be able to evaluate the limitations of data science related information effectively in various formats to appropriate audiences. Students will be able to effectively communicate data science related information effectively in various formats to appropriate audiences. Students will be able to effectively communicate data science related information effectively in various formats will be able to effectively communicate data science related information effectively in various formats will be able to be more format. disseminate, and orally communicate technical makerials. Students will be able to be pron-technical professionals visualize, explore, and act on data science findings. Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action based on standards of professional conduct. Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action based to unterpret the activities and choices of others within an ethical framework and determine an appropriate action between the activities and choices of others within an ethical framework and determine an appropriate action action analysis. Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action action analysis. Students will be able to open action and action analysis. Students will be able to explain how data asserts can be used to develop competitive advantage. Students will be able to explain how data asserts can be used to develop competitive advantage. Students will be able to explain how data asserts can be used to develop competitive advantage. Students will be able to explain how data asserts can be used to develop competitive advantage. Students will be able to e	Students will be able to interpret data science analysis outcomes. 3 Students will be able to interpret data science findings. 3 Students will be able to interpret data science findings. 3 Students will be able to evaluate the limitations of data science findings. 3 Students will be able to evaluate the limitations of data science related information effectively in various formats to appropriate audiences. 3 Students will be able to write, format, disseminate, and ortally communicate technical materials. 4 Students will be able to write, format, disseminate, and ortally communicate technical materials. 5 Students will be able to be include the cative of the cative of data in all aspects of their profession. 5 Students will be able to identify and analyze social, legal, and ethical sizes of data in all aspects of their profession. 6 Students will be able to identify and analyze social, legal, and ethical sizes of others will be able to identify and analyze social legal, and ethical sizes of others will be able to interpret the activities and onloives of others will be able to interpret the activities and onloives of others will be able to interpret the activities and onloives of others will be able to interpret the activities and onloives of others will be able to interpret the activities and onloives of others will be able to be interpret the activities and onloives of others will be able to be explain how data assets can be used to develop competitive advantage. 3 Students will be able to identify and appraise the leadership and management stillsrequired to direct a team of data science professional goals.	C)		8) Students will be able to assess the model used to solve data science tasks.		×		×		×					
 9) Students will be able to unfergret data, entract meaningful information, and assess findings. 10) Students will be able to unfergret data, entract meaningful information and sessess findings. 11) Students will be able to unfergret data, entract meaningful information effectively in various formats to appropriate audiences. 12) Students will be able to unfergret format, disseminate, and orally communicate technical materials. 13) Students will be able to be promptive and an advantage social, legal, and ethical materials will be able to identify and analyze social, legal, and ethical use of data in all aspects of their profession. 14) Students will be able to identify and analyze social, legal, and ethical issues in data science. 15) Students will be able to interpret and apply a professional code of ethics relevant to the data science profession. 16) Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate activities and apply a professional code of ethics relevant to the data science profession. 17) Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate activities and apply a professional code of ethics relevant completes. 18) Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate activities and appraise the activities and ethical experiments and appraise the activities and ethical experiments are active and appraise the activities and before the formation of a situation analysis. 18) Students will be able to identify and appraise the leadership and management stitistisequired to direct a team of data science applain towards assets can be used to develop competitive advantage. 18) Students will be able to identify and appraise the leadersh	 9) Students will be able to interpret data, entra act meaningful information, and assess findings. 10) Students will be able to uniterpret data, entra act meaningful information effectively in various formats to appropriate audiences. 11) Students will be able to —effectively communicate data science related information effectively in various formats to appropriate audiences. 12) Students will be able to write, format, disseminate, and orially communicate technical materials. 13) Students will be able to write, format, disseminate, and orially communicate technical materials. 14) Students will be able to identify and analyze social, legal, and ethical issues in data science. 15) Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action based on standards of professional conduct. 16) Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action based on standards of professional conduct. 16) Students will be able to interpret the activities and choices of others within an ethical testines professionals cover a spatial material asset can be used to develop competitive advantages. 16) Students will be able to interpret the activities and choices of others within an advantage. 17) Students will be able to explain how data assets can be used to develop competitive advantages. 18) Students will be able to identify and appriate the leadership and management stillisequired to direct a team of data science professionals covaried meeting organizational goals. 18) Students will be able to identify and appriate the leadership and management stillisequired to direct a team of data science professionals covaried. 	60	_	Students will be able to interpret data science analysis outcomes.			Г	├	├	┞	L			İ	
 Budents will be able to evaluate the limitations of data science findings. Students will be able to evaluate the limitations of data science related information effectively in various formats to appropriate audiences. Students will be able to be only format, disseminate, and ordally communicate data science findings. Sudents will be able to be pron-technical professionals visualize, explore, and act on data science findings. Students will be able to be pron-technical professional visualize, explore, and act of data in all aspects of their profession. Students will be able to interpret and apply a professional code of ethics netwant to the data science. Students will be able to interpret and apply a professional code of ethics netwant to the data science profession. Students will be able to interpret and apply a professional code of ethics netwant to the data science profession. Students will be able to interpret middles from data resources into actionable business strategies. Students will be able to explain how data asserts can be used to develop competitive advantage. Students will be able to explain how data asserts can be used to develop competitive advantage. Students will be able to explain how data asserts can be used to develop competitive advantage. Students will be able to explain how data asserts can be used to develop competitive advantage. Students will be able to explain how data asserts can be used to develop competitive advantage. Students will be able to explain how data asserts can be used to develop competitive advantage. Students will be able to explain how data asserts can be used to develop competitive advantage. Students will be able to explain how data asserts can be used to develop competitive advantage. 	 8) Students will be able to addition of data science findings. 10) Students will be able to understand the imitations of data science related information effectively in various formats to appropriate audiences. 11) Students will be able to under the communicate data science findings. 12) Students will be able to be the pron-technical professionals visualize, explore, and act on data science findings. 13) Students will be able to be the pron-technical professional straining and presenting. 14) Students will be able to identify and analyze social legal and ethical tissues in data science findings. 15) Students will be able to identify and analyze social legal and ethical issues in data science profession. 16) Students will be able to interpret and apply a professional code of ethics relevant to the data science profession. 17) Students will be able to interpret and apply a professional orde of ethics relevant to the data science professional science capabilities into the formation of a situation analysis. 18) Students will be able to interpret the activities and choices of others within an ethical transformation of a situation analysis. 18) Students will be able to identify and appraise the leadership and management stillsrequired to direct a team of data science professional conduct of energy and management stillsrequired to direct a team of data science professional social fine able to identify and appraise the leadership and management stillsrequired to direct a team of data science professional social still be able to identify and appraise the leadership and management stillsrequired to direct a team of data science professional social strains of the science and appraise the leadership and management stillsrequired to direct a team of data science professional social still and appraise the leadership and management stillsrequired to decent a team of data science profes	-		9) Students will be able to interpret data, exit act meaningful information, and assess findings.		×	_	×		×	_		×		
Students will be able to write, format, disseminate, and orally communicate data science related information effectively in various formats to appropriate audiences. 10 Students will be able to write, format, disseminate, and orally communicate technical materials. 11 Students will be able to write, format, disseminate, and orally communicate technical materials. 12 Students will be able to help non-technical professionals visualize, explore, and act on data science findings. 13 Students will be able to facilitate data-informed discussions through listening, questioning, and profession. 14 Students will be able to identify and analyze social, legal, and ethical issues in data science. 15 Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action based on standards of professional conduct. 16 Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action of a students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action of a students will be able too. Litansform findings from data resources into actionable business strategies. 17 Students will be able too. Litansform findings from data resources into action of also science professionals toward meeting organizational goals. 18 Students will be able to explain how data assets can be used to develop competitive advantage. 18 Students will be able to develop competitive advantage. 18 Students will be able to identify and appraise the leadership and management stills required to direct a team of data science professionals toward meeting organizational goals. 18 Students will be able to identify and appraise the leadership and management stills required to direct a team of data science professionals toward management stills required to general professionals toward management stills required to the p	Students will be able to write format, disseminate, and orally communicate data science related information effectively in various formats to appropriate audiences. X	100		(0) Students will be able to evaluate the limitations of data science findings.		×	×		-	×	_		×		
11 Students will be able to withe, format, disseminate, and orally communicate technical materials. 22 Students will be able to help non-technical professionals visualize, explore, and act on data science findings. 23 Students will be able to facilitate data-informed discussions through listening, questioning, and presenting. 24 Students will be able to facilitate data-informed discussions through listening, questioning, and profession. 25 Students will be able to facilitate data-informed discussions through listening, questioning, and an all aspects of their profession. 25 Students will be able to interpret and apply a professional code of ethics relevant to the data science profession. 26 Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action based on standards of professional code of ethics relevant to the data science professional conduct. 27 Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action of a situation analysis. 26 Students will be able to explain how data assets can be used to develop competitive advantage. 27 Students will be able to explain how data assets can be used to develop competitive advantage. 28 Students will be able to identify and appraise the leadership and management stills required to direct a team of data science professionals toward meeting organizational goals. 28 Students will be able to identify and appraise the leadership and management stills required to direct a team of data science professionals toward meeting organizational goals.	(1) Students will be able to withe, format, disseminate, and orally communicate technical materials. X <	9	ш	Students will be able to _effectively communicate data science related information effectively in various formats to appropriate audiences.					Н			L		İ	
Condents will be able to facilitate data-informed discussions through listening questioning and presenting Students will be able to facilitate data-informed discussions through listening questioning and presenting Students will be able to callitate data-informed discussions through listening questioning and presenting Students will be able to callitate data-informed discussions through listening questioning and presenting and analyze social, legal, and ethical issues in data science. Students will be able to interpret and apply a professional code of ethics relevant to the data science profession. Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action based on standards of professional code of ethics relevant to the data science professional code of ethics relevant to the data science professional code or strategies. Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action based on standards of professional conduct. Students will be able to explain how data assets can be used to develop competitive advantage. Students will be able to explain how data assets can be used to develop competitive advantage. Students will be able to identify and appraise the leadership and management stills required to direct a team of data science professionals toward meeting organizational goals.	12 Students will be able to feel mon-technical professionals visualize, explore, and act on data science findings. 13 Students will be able to facilitate data-informed discussions through listening questioning, and presenting. 14 Students will be able to facilitate data-informed discussions through listening questioning, and present of their profession. 15 Students will be able to interpret and apply a professional code of ethics relevant to the data science. 16 Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action based on standards of professional conduct. 16 Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action based on standards of professional conduct. 17 Students will be able to explain how data assets can be used to develop competitive advantage. 18 Students will be able to explain how data assets can be used to develop competitive advantage. 18 Students will be able to identify and appriate the leadership and management skillsrequired to direct a team of data science professionals toward meeting organizational goals. 18 Students will be able to identify and appriate the leadership and management skillsrequired to direct a team of data science professionals toward meeting organizational goals.	r		(1) Students will be able to write, format, disseminate, and orally communicate technical materials.			×		Ĥ	~					×
53 Students will be able to facilitate data-informed discussions through listening, questioning, and presenting. 5 Students will be able to facilitate data-informed discussions through listening questioning, and presents of their profession. 5 Students will be able to identify and analyze social, legal, and ethical issues in data science. 7 Students will be able to interpret and apply a professional code of ethics relevant to the data science profession. 8 Students will be able to interpret and apply a professional code of ethics relevant to the data science profession. 8 Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action based on standards of professional conduct. 7 Students will be able to interpret the activities and choices of situation analysis. 8 Students will be able to transform findings from data resources into actionable business strategies. 8 Students will be able to explain how data assets can be used to develop competitive advantage. 8 Students will be able to explain how data assets can be used to direct a team of data science professionals toward meeting organizational goals. 8 Students will be able to identify and appraise the leadership and management stills required to direct a team of data science professionals toward meeting organizational goals. 8 Students will be able to identify and appraise the leadership and management stills required to direct a team of data science professionals toward meeting organizational goals. 8 Students will be able to definity and appraise the leadership and management stills required to direct a team of data science professionals toward meeting organizational goals. 9 Students will be able to definity and appraise the leadership and management stills required to direct a team of data science professionals toward meeting organizational goals. 9 Students will be able to identify and appraise the second of the second of the second of the second o	Students will be able to facilitate data-informed discussions through listening, questioning, and presenting. Students will be able to facilitate data-informed discussions through listening, questioning, and presents of their profession. Yes the content of the professional code of ethics relevant to the data science profession. Students will be able to interpret the activities and choices of others within an ethical if amework and determine an appropriate action based on standards of professional conduct. Students will be able to interpret the activities and choices of others within an ethical if amework and determine an appropriate action based on standards of professional conduct. Students will be able to interpret the activities and choices of others within an ethical interpret the activities and choices of others within an ethical interpret the activities and choices of others within an ethical interpret the activities and develop competitive advantage. Students will be able to explain how data assets can be used to develop competitive advantage. Students will be able to identify and appriate the leadership and management skillsrequired to direct a team of data science professionals toward meeting organizational goals.	- 00		(2) Students will be able to help non-technical professionals visualize, explore, and act on data science findings.			×		Ĥ		_				
Students will be able to_uvalue and safeguard the ethical use of data in all aspects of their profession. X	Students will be able to_value and safeguard the ethical use of data in all aspects of their profession. X Students will be able to identify and analyze social legal, and ethical issues in data science. X Students will be able to interpret and apply a professional code of ethics relevant to the data science profession. Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action based on standards of professional conduct. Students will be able to transform findings from data resources into actionable business strategies. Students will be able integrate data science capabilities into the formation of a situation analysis. Students will be able integrate data science expabilities into the formation of a situation analysis. Students will be able to identify and appriate the leadership and management skillsrequired to direct a team of data science professionals toward meeting organizational goals.	0		(3) Students will be able to facilitate data-informed discussions through listening, questioning, and presenting.			×		ĥ		_				
5 Students will be able to interpret and apply a professional code of ethics relevant to the data science profession. 5 Students will be able to interpret and apply a professional code of ethics relevant to the data science profession. 6 Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action based on standards of professional conduct. 6 Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action based on standards of professional conduct. 7 Students will be able to explain how data assets can be used to develop competitive advantage. 8 Students will be able to explain how data assets can be used to develop competitive advantage. 8 Students will be able to identify and appraise the leadership and management stills required to direct a team of data science professionals toward meeting organizational goals.	14 Students will be able to interpret and apply a professional code of ethics relevant to the data science profession. 15 Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action based on standards of professional conduct. 16 Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action based on standards of professional conduct. 16 Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action based on standards of professional conduct. 17 Students will be able to explain how data assets can be used to develop competitive advantage. 18 Students will be able to identify and appriate the leadership and management skillsrequired to direct a team of data science professionals toward meeting organizational goals.	8	L	Students will be able to_value and safeguard the ethical use of data in all aspects of their profession.				├	├	H	L	L		İ	
55 Students will be able to interpret and apply a professional code of ethics relevant to the data science profession. 56 Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action based on standards of professional conduct. X Students will be able to transform findings from data resources into actionable business strategies. Students will be able integrate data science capabilities into the formation of a situation analysis. Students will be able to explain how data assets can be used to develop competitive advantage. Students will be able to identify and appraise the leadership and management stills required to direct a team of data science professionals toward meeting organizational goals.	55 Students will be able to interpret and apply a professional code of ethies relevant to the data solence profession. 56 Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action based on standards of professional conduct. X	7.			×					H		×			
Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action based on standards of professional conduct. Students will be able to transform findings from data resources into actionable business strategies. Students will be able integrate data science capabilities into the formation of a situation analysis. Students will be able integrate data accience capabilities into the formation of a situation analysis. Students will be able to explain how data assets can be used to develop competitive advantage. Students will be able to dentify and appraise the leadership and management stills required to direct a team of data science professionals toward meeting organizational goals.	Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action based on standards of professional conduct. Students will be able to transform findings from data resources into actionable business strategies. The students will be able integrate data science capabilities into the formation of a situation analysis. Students will be able to explain how data assets can be used to develop competitive advantage. Students will be able to explain how data assets can be used to develop competitive advantage. Students will be able to identify and appriate the leadership and management skillsrequired to direct a team of data science professionals toward meeting organizational goals.	23		(5) Students will be able to interpret and apply a professional code of ethics relevant to the data science profession.				Н	-	-	_	×			
Students will be able to transform findings from data resources into actionable business strategies. The Students will be able integrate data science capabilities into the formation of a situation analysis. Students will be able to explain how data assets can be used to develop competitive advantage. Students will be able to identify and appraise the leadership and management stills required to direct a team of data science professionals toward meeting organizational goals.	Students will be able integrate data science capabilities into the formation of a situation analysis. Students will be able integrate data science capabilities into the formation of a situation analysis. Students will be able to explain how data assets can be used to develop competitive advantage. Students will be able to identify and appraise the leadership and management stillsrequired to direct a team of data science professionals toward meeting organizational goals. Students will be able to identify and appraise the leadership and management stillsrequired to direct a team of data science professionals toward meeting organizational goals.	83		(6) Students will be able to interpret the activities and choices of others within an ethical framework and determine an appropriate action based on standards of professional condi-	ند					-		×			
(7) Students will be able integrate data science capabilities into the formation of a situation analysis. (8) Students will be able to explain how data assets can be used to develop competitive advantage. (9) Students will be able to identify and appraise the leadership and management stillsrequired to direct a team of data science professionals toward meeting organizational goals.	(7) Students will be able integrate data science capabilities into the formation of a situation analysis. (8) Students will be able to explain how data assets can be used to develop competitive advantage. (9) Students will be able to identify and appraise the leadership and management skillsrequired to direct a team of data science professionals toward meeting organizational goals.	7.	9	Students will be able to transform findings from data resources into actionable business strategies.				├	├	┞	Ļ			İ	
(8) Students will be able to explain how data assets can be used to develop competitive advantage. (9) Students will be able to identify and appraise the leadership and management skillsrequired to direct a team of data science professionals toward meeting organizational goals.	(8) Students will be able to explain how data assets can be used to develop competitive advantage. (9) Students will be able to identify and appraise the leadership and management skillsrequired to direct a team of data science professionals toward meeting organizational goals.	10		(7) Students will be able integrate data science capabilities into the formation of a situation analysis.										×	
(9) Students will be able to identify and appraise the leadership and management skillsrequired to direct a team of data science professionals toward meeting organizational goals.	(9) Students will be able to identify and appraise the leadership and management skillsrequired to direct a team of data science professionals toward meeting organizational goals.	28		(8) Students will be able to explain how data assets can be used to develop competitive advantage.										×	
	200	57		(9) Students will be able to identify and appraise the leadership and management skillsrequired to direct a team of data science professionals toward meeting organizational goals.	H			\vdash	H	H	_			×	

Appendix B

Following rubrics were used to examine the four learning objectives for three different projects (A: Visualization Project, B: Network analysis project, C: Text Mining project).

A. Visualization Project Rubric

Criteria	Excellent	Strong	Competent	Needs Improvement	Needs Significant Revision
You have a well-defined purpose. The story portrayed in your visualization aligns with the purpose of your visualization. The story reflected in your visualization is novel and the shows interesting pattern(s).	10 points	8 points	6 points	4 points	2 points
Choice of dataset used is rich and multivariate. Your work is original and rigorous.	40 points	30 points	20 points	15 points	5 points
Choice of variables aligns well with the purpose of the visualization	10 points	8 points	6 points	4 points	2 points
Choice of visualization tools and methodology adheres well with design principles learned in this course.	10 points	8 points	6 points	4 points	2 points
Provide and explain three progressively improving iterations. Explain pros and cons for each iteration. Iterations are thoughtful and rigorous.	40 points	30 points	20 points	15 points	5 points
The visualization is self – explanatory, and has no puzzling (confusing) pieces. The visualization stimulates viewer engagement and attention.	10 points	8 points	6 points	4 points	2 points
Overall Score	A 108 or more	B 96 or more	C 72 or more	F 0 or more	

B. Networking Project Rubric

Interpret data, extract meaningful information, and assess findings.	Excellent	Strong	Competent	Needs Improvement	Needs Significant Revision
Choice of dataset used is rich and multivariate (with several node and edge attributes). Data and the subset selected are well explained.	20 points	16 points	12 points	8 points	4 points
Visualizations are easy to understand. Accompanying text highlights the key points observed in the visualizations.	40 points	30 points	20 points	15 points	5 points
Community structures are well explained.	10 points	8 points	6 points	4 points	2 points
The path coefficients and p value of the ERGM model are well explained.	10 points	8 points	6 points	4 points	2 points
ERGM Model goodness of fit is well explained using several different criteria.	10 points	8 points	6 points	4 points	2 points
Identify and classify relevant variables for data science tasks.	Excellent	Strong	Competent	Needs Improvement	Needs Significant Revision
There is well explained hypothesis for possible relationship between node / edge attributes and linkage possibilities.	10 points	8 points	6 points	4 points	2 points

Choose and apply tools and methodologies to solve data science tasks.	Excellent	Strong	Competent	Needs Improvement	Needs Significant Revision
Network visualizations are prepared, and network summary is presented.	10 points	8 points	6 points	4 points	2 points
Community structures are detected.	40 points	30 points	20 points	15 points	5 points
ERGM modeling is carried out.	10 points	8 points	6 points	4 points	2 points
Help non-technical professionals visualize, explore, and act on data science findings.	Excellent	Strong	Competent	Needs Improvement	Needs Significant Revision
The network visualizations and the accompanying explanations along with the report are detailed but still clear and concise. Follows the project guidelines carefully.	30 points	24 points	18 points	12 points	6 points
Overall Score	A 171 or more	B 152 or more	C 114 or more	F 0 or more	

C. Text Mining Project Rubric

Dataset	Excellent	Strong	Competent	Needs	Not Present
				Improvement	
Choice of dataset used is rich and multivariate (with several node and edge attributes). Data and the subset selected are well explained.	30 points	24 points	18 points	12 points	0 points
Dataset is explained well, using visual and descriptive methods.	10 points	8 points	6 points	4 points	0 points
Report: Meet basic requirements	Excellent	Strong	Competent	Needs Improvement	Not Present
Cover page.	8 points	6 points	4 points	2 points	0 points
Index.	8 points	6 points	4 points	2 points	0 points
References.	8 points	6 points	4 points	2 points	0 points
Report: Interpret data, extract meaningful information, and assess findings.	Excellent	Strong	Competent	Needs Improvement	Needs Significant Revision
Report highlights the key points observed in the analysis.	8 points	6 points	4 points	2 points	1 point
Report: Identify and classify relevant variables for data science tasks.	Excellent	Strong	Competent	Needs Improvement	Needs Significant Revision
Report identifies relevant variables needed for the text mining task.	8 points	6 points	4 points	2 points	1 point
Report: Choose and apply tools and methodologies to solve data science tasks.	Excellent	Strong	Competent	Needs Improvement	Needs Significant Revision
Appropriate Text Mining tools are applied. Report provides adequate explanation of how the analysis was carried out.	16 points	12 points	8 points	4 points	2 points
Report: Help non-technical professionals visualize, explore, and act on data science findings.	Excellent	Strong	Competent	Needs Improvement	Needs Significant Revision
The findings are explained with carefully crafted visualizations and clear (and detailed) explanations that are easy for any non-technical person to understand as well.	24 points	18 points	12 points	6 points	3 points
R Code	Present and very well commented	Present and well commented	Present and commented	Present but not commented or poorly commented	Not Present
Submission includes R code file and proper comments.	40 points	32 points	24 points	16 points	0 points
Overall Score	A 144 or more	B 128 or more	C 96 or more	F 0 or more	