College of Arts and Sciences Department Assessment

Department Reports

BIOLOGY DEPARTMENT ASSESSMENT REPORT 2016-2017

Tara Rajaniemi, Biology Department Assessment Coordinator

Contents

I. Biology Assessment Committee

The committee members are Tara Rajaniemi (chair), Robert Drew, Whitney Hable, Ben Winslow and Cindy Ladino. The committee met once during the spring semester.

II. Program Assessment Plan

In the spring of 2012, the department completed a program-level assessment plan. The department has established learning objectives in three areas:

1) Content knowledge
   - Upon completion of the two-year core, Biology majors will be able to identify, explain, differentiate, and utilize fundamental concepts related to cellular and molecular biology, organismal biology, ecology, and evolutionary biology.
   - Upon graduation, Biology majors will have more in-depth understanding of concepts in one or more sub-disciplines.
2) Proficiency in analytical and technical skills: At all levels of the major, and with increasing sophistication over time, Biology majors will be able to
   - articulate biological questions and formulate hypotheses
   - design an experiment to test a hypothesis
   - collect and analyze data using appropriate biological research tools and computer software
   - express results in writing, verbally, and graphically
   - explain the importance of the results in the context of the original hypothesis
3) Fluency in the scientific literature: Upon graduation, Biology majors will be able to
   - read, with critical understanding, current journal articles in at least one field of biology
   - communicate, verbally and in writing, the findings of current articles
   - evaluate the literature relevant to a biological question

III. Assessment Activities

A. Content knowledge: Major Field Test

We have been using the Major Field Test in the capstone course (BIO 499) to assess content knowledge. A total of 42 students took the test in AY 2015-16 and 55 in 2016-17. The test was taken by 36 of 61 students graduating in Spring 2016, 4 of 10 graduating in Fall 2016, and 47 of 52 planning to graduate in Spring 2017.[1]

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[1] One student enrolled in BIO 499 in 2016-17 did not complete the test. The remaining graduates fell under Gen Ed requirements and did not take BIO 499.

Scores are shown here based on the year the test was taken, rather than graduation year. Assessment indicators are available only for test-taking cohorts, and most students (89%) took the test in the academic year of their graduation.

Reports include the total test score, subscores for general content areas (shaded gray), and scores for assessment indicators for some more specific content areas (indented below the related subscore area). Values in the table are percentiles for institutional means.[2]

Our students consistently score below national means, with the highest scores at the 50th percentile. Scores in some areas shifted between last year and this year. Changes of more than 10 percentile points are noted.

	score percentile			% of coursework	
	2015/16	2016/17	change	2015/16	2016/17
# students	**42**	**55**			
Total score	30	30			
Cell Biology subscore	28	28			
Biochemistry and Cell Energetics	35	35		11	11
Cellular Structure, Organization, Function	23	27		9	9
Genetics and Molecular Biology subscore	28	41	+13		
Molecular Biology and Molecular Genetics	30	39		15	12
Organismal Biology subscore	27	27			
Diversity of Organisms	44	38		13	14
Organismal - Animals	39	26		21	24
Organismal - Plants	6	23	+17	1	1
Population Bio Ecology Evolution subscore	45	38			
Population Genetics and Evolution	50	50		9	9
Ecology	40	29	-11	8	11
Analytical Skills	39	27	-12		

A major focus of our activities this year was to map upper-level course offerings to MFT assessment indicators, in an effort to understand the patterns in scores better.

We distributed a survey (attached) to instructors asking them to estimate the percent of class time spent on topics covered by each assessment indicator, as described by the ETS. We combined these data with data on which courses were taken by each of the tested students, excluding courses taken after they were tested. As of 5/19, only half of the surveys had been returned and the results reported here are based on estimates for those courses.

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[2] Last year's report used percentiles based on individual means for subscores, so the values differ.

Students tested in 2016-17 took more upper-level electives (6.36) than those tested in 2015-16 (5.55).[3] The subject areas covered by their courses, though, differed very little. Changes in enrollment in specific courses seem to be more informative. Survey results were helpful for identifying these courses.

- The increased subscore in Genetics and Molecular Biology may reflect increased enrollment in Immunology (BIO 310, 26% of 2015-16 students vs 64% of 2016-17 students), General Microbiology (BIO 321, 45% vs 55%) and Advanced Cell Biology (BIO 431, 14% vs 20%).
- The increased score in Organismal Biology of Plants may reflect increased enrollment in Plant Biology (BIO 350, 2% vs 11%). This area remained the lowest score. Plant Biology is the only upper-level course offering substantial coverage of this topic, and relatively few students take it.
- The decreased score in Analytical Skills may reflect decreased enrollment in Biological Statistics (BIO 430, 48% vs 33%).
- The decreased score in Ecology runs counter to the increased enrollment in General Ecology (BIO 314, 14% vs 24%) and Community Ecology (BIO 402, 2% vs 9%).

Another source of variation between years may come from the core courses. In Fall 2013, the instructor for Biology of Organisms (BIO 121 and 122) changed from Dr. Paz-y-Miño to Dr. Winslow. At around the same time, coordination of course content with the community colleges improved, so that the number of students transferring in with BIO 121 increased.

Almost all the students tested in 2015-16 (38 of 42) took BIO 121 with Dr. Paz-y-Miño. Of the 55 students tested in 2016-17, 30 had Paz-y-Miño as an instructor, 12 had transfer credit, and 13 took the course with Winslow. The shift in instructors probably resulted in a shift in emphasis on different subject areas. Next year's graduates will be the first cohort to have started as freshman with Winslow as an instructor, so we will be looking more closely at this next year.

B. Analytical and Technical Skills and Fluency in the Scientific Literature

Although we have developed rubrics for assessing these objectives, we determined that the assignments in the capstone class don't provide the evidence needed. Our faculty survey also aimed to identify courses with assignment that can be used for assessment.

Area 2: Fourteen upper-level courses include a lab component. Four of those include assignments that the instructor believes require all the learning objectives for this area. There are another four courses that we don't have survey data for, but that might have suitable assignments. Only 18 of 52 students graduating in 2016-17 took one of the courses that are known to have appropriate assignments.

It seems unlikely that we can use upper-level electives to gather enough evidence to assess learning in this area. We will have to revisit ways to assess the capstone posters.

Area 3: Based on survey results from only half the courses, there are 10 upper-level courses that have written assignments that require critical reading of the literature, and 7 with written assignments that

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[3] This total includes courses offered under BIO 411 (Proseminar), which is used as a "topics" course. There is no easy way to tell from COIN or a transcript which topic a student has taken under 411, so these are not included in content analyses. The average student takes one 411 course.

require evaluation of the literature. These courses were taken by 41 and 50 of the 2016-17 graduates. We can collect assignments from these courses to assess learning in area 3.

C. University Studies Cluster 5 objectives

The committee met with most of the faculty who have taught the capstone, to reflect on the course and to discuss how to assess the Cluster 5 learning objectives.

Cluster 5A learning objectives: Upon completion of the capstone study, students will be able to

1. Synthesize the knowledge and skills gained within major courses, independently complete a research-based project or creative work and integrate the results of both in an open-ended project or experience (projects within the major are encouraged).
2. Integrate knowledge and principles from the field of study with those of the broader University Studies curriculum.
3. Demonstrate advanced information literacy skills by selecting, evaluating, integrating and documenting information gathered from multiple sources into discipline-specific writing.
4. Communicate effectively, both orally and in writing, the results of the project or experience.

Students are demonstrating the Cluster 5A learning objectives in the poster and the annotated bibliography. Generally, the faculty think these assignments are working well. Some students whose projects involved a lot of research in the literature have been frustrated that they couldn't express that on the poster. In those cases it might help for them to go back to the annotated bibliography and revise it and attach it to the poster.

Objectives 1, 2, and 4 could be assessed based on the poster judging forms filled out by faculty and grad students visiting the posters. We will collect any forms that people have saved to look at the scores.

Cluster 5A learning objectives: Upon completion of this requirement, students will be able to

1. Identify the needs and resources of the communities to which they belong. For the purposes of this course, the community is the professional community of biologists.
2. Apply knowledge and skills gained through academic study to real problems and/or opportunities within their communities.
3. Describe the connections between learning on campus and the issues and needs of broader academic, professional or civic communities.
4. Articulate the value of engagement to other members of their communities.

Objectives 1 and 2 are built into the project, and seem to be met. The biggest concerns were with Objectives 3 and 4, and whether students are really engaging with the community. These were the main points of discussion:

- The final reflection (meant to cover Objective 4) has been graded pretty loosely, and we think that's OK. Just seeing that the student made the effort is enough to meet the objective.
- The students mostly don't seem able to engage with each other or with guest speakers at the level of really discussing and critiquing their work – they don't engage with their professional community at the level we would like to see. It may just be that they're not at that level of

critical thinking. [My thought, after the meeting, is that this isn't something we can fix within the capstone. It's something we'd have to work on throughout the curriculum.]

- Blog posts aren't working as engagement, because the quality of the writing isn't good enough that we want to make them available to the public.
- There's also not a lot of engagement happening at the poster sessions, because not a lot of people are showing up. A better approach might be to take the posters to an audience. For this coming Fall, we will aim to run the poster session at Dartmouth High.
- The blog post (or a similar assignment) is worth keeping as an exercise in communicating science to the general public. As students practice their poster presentations, they should also work on one version for scientists and one for a general audience that focuses on relevance/importance.

IV. Future plans

Beginning in the fall, the assessment committee will

- Pester faculty to complete the course content survey.
- Revisit assessement of capstone posters for Area 2 learning objectives.
- Collect assignments from upper-level courses to assess Area 3 learning objectives.

The Biology curriculum revision was approved and goes into effect in September 2017. To provide a baseline for Area 2 objectives for these students, we will begin collecting and scoring lab reports from freshman biology labs, as we have done previously. We will also discuss whether content knowledge can be assessed for the freshmen.

V. Upper-level course survey

The survey given to instructors of upper-level courses follows. Instructors received one sheet per course, along with a cover letter explaining the purpose of the survey.

1. MFT Content Areas. Considering only the lecture portion of your course (ignoring any labs), record the number of class periods you spend on topics from each area. Include time spent on lecture and other activities like discussion of papers and working on problems that are relevant to the content area. These numbers don't have to be exact; a rough estimate will do.

Content area	# of class periods
Biochemistry and Cell Energetics biochemical compounds and macromolecules; first and second laws of thermodynamics; enzyme activity and regulation; ATP and energy-producing pathways; post-translational modification, transmembrane insertion and sorting of proteins; cell-cell communication	
Cellular Structure, Organization, Function organelles and other cellular components; cytoskeleton and cell motility; cell surfaces and membrane function; extracellular space; cell theory and germ theory; distinctions among archaea, eubacteria and eukaryotic cells; cell growth, cell cycle, mitosis and cytokinesis	
Molecular Biology and Molecular Genetics DNA replication and mutation; gene structure, introns and exons; regulation of gene expression; RNA transcription and modification; translation of mRNA; bacteriophages and viruses; control of normal development; cancer; molecular aspects of immunology; genetic engineering; meiosis and chromosomal alterations; modes of inheritance; probability and pedigree analysis; segregation, recombination and chromosome mapping; polyploidy and aneuploidy; sex determination; non-Mendelian inheritance; prokaryote genetics	
Diversity of Organisms phylogenetic relationships, classification, morphology, life histories and general biology of bacteria and acheaea, protists, fungi, plants and animals; origin of life and endosymbiont theory; fossil record and human evolution; systematic and molecular phylogeny; adaptations to habitats	
Organismal Biology of Animals Animal organ systems (vertebrates and invertebrates) – comparative structure, function and organization: digestion and nutrition, excretion and osmoregulation, gas exchange and ventilation, circulatory systems, support and movement, nervous and endocrine systems, integument, immune system, metabolic rates and energy; Animal reproduction, growth and development: reproductive structures and gametogenesis; fertilization, cleavage and gastrulation; comparative embryology; reproduction in nonchordate animals	
Organismal Biology of Plants Plant organ systems (seed plants and nonseed plants) – comparative structures, function and organization: roots, stems and leaves; plant energetics; water relations; mineral nutrition; translocation and storage; hormones, photoperiods and tropisms; nonphotosynthetic strategies; Plant reproduction, development and growth: reproductive structures, gametogenesis and sporogenesis; fertilization and alternation of generations; embryogeny and germination; meristems and growth	
Population Genetics and Evolution genetic variability and polyploidy; distributions of genetic variability; Hardy- Weinberg equilibrium and genetic drift; heritability, fitness and adaptation; natural selection; modes of speciation; isolating mechanisms; convergence, divergence and adaptive radiation; extinction; evidence for evolution; evolution of higher taxa; evolutionary rates and punctuated equilibrium; molecular evolution; neutral mutations; coevolution	
Ecology biogeographic and temporal patterns, biomes and climates; habitat selection, tolerances, limiting factors and resource acquisition; demography and population dynamics; animal behavior; competition, predation, parasitism and symbiosis; community structure and niche; species richness and species diversity; change and succession; introduced species; energy flow, biochemical cycling and decomposition; productivity; food webs; human demography; resource depletion and pollution; economic botany; habitat modification and effects on organisms; emerging diseases and endemic diseases	
Other lecture periods spent on material or activities not fitting into any of the areas above	

Course: _____   Instructor: _____

The final area reported by the Major Field Test encompasses skills that might be applied in any content area:

- <u>Science as a way of knowing</u>: understanding quantitative aspects and limitations of science; understanding the place of hypotheses and theories in biology; identification and testing of hypotheses
- <u>Experimental design</u>: identification of variables and establishing experimental controls; ensuring that measured parameters are affected by phenomenon being studied
- <u>Interpretation, data analysis, inductive reasoning and drawing conclusions from data</u>: application of information to solve a problem or make a prediction; demonstration of proficiency with quantitative concepts and familiarity with units of measure; demonstration of an understanding of probability theory and statistics; interpretation of data, graphs, tables and statistical analyses

About how often do your students learn about or use these skills? Count a lecture, lab, or assignment if it involves any of these skills, whether they are a large or small part of the activity.

How many of the ...

lectures or in-class activities	____ 100%	____ ≥ 75%	____ ≥ 50%	____ ≥ 25%	____ < 25%	____ none/NA
out-of class assignments	____ 100%	____ ≥ 75%	____ ≥ 50%	____ ≥ 25%	____ < 25%	____ none/NA
labs or lab assignments	____ 100%	____ ≥ 75%	____ ≥ 50%	____ ≥ 25%	____ < 25%	____ none/NA

2. Department Learning Goals

<u>Analytical and Technical Skills</u> includes five specific objectives. Graduating students should be able to (1) articulate biological questions and formulate hypotheses, (2) design an experiment to test a hypothesis, (3) collect and analyze data using appropriate tools and software, (4) express results in writing, verbally, and graphically, and (5) explain the importance of the results in the context of the original hypothesis.

If your course has a lab component, are there one or more labs in which students submit a written assignment demonstrating ALL or SOME of the skills listed?

_____ Yes, with ALL of the skills   _____ Yes, with SOME of the skills   _____ No or N/A

<u>Fluency in the Scientific Literature</u> includes two objectives.

First, graduating students should be able to read, with critical understanding, current journal articles in at least one field of biology. Reading critically includes (1) identifying the paper's context within the questions and concepts of the subdiscipline, (2) identifying the paper's hypotheses and their rationale, (3) evaluating the methods, (4) interpreting the results, and (5) evaluating the conclusions.

Does your course require students to do critical reading of the primary literature?   _____ YES _____ NO

If so, do students submit a written assignment that uses ALL or SOME of the skills listed?

_____ Yes, with ALL of the skills   _____ Yes, with SOME of the skills   _____ No or N/A

The second objective for Fluency in the Scientific Literature is that graduating students should be able to evaluate the literature relevant to a topic. Evaluating the literature includes (1) determining the extent of information needed to address a question, (2) using effective search strategies and resources to identify sources, (3) organizing and synthesizing the information found, and (4) citing sources appropriately.

Does your course require students to do evaluation of the literature?   _____ YES _____ NO

If so, do students submit a written assignment that uses ALL or SOME of the skills listed?

_____ Yes, with ALL of the skills   _____ Yes, with SOME of the skills   _____ No or N/A

End of Year Report on Program Assessment, Spring 2017

Submitted by Anne M Liberty, FTL and CHM Assessment Coordinator

Department of Chemistry and Biochemistry

Overview of Ongoing Assessment Plans

Laboratory Course Revisions – Chemistry Majors

A continuing assessment issue discussed for the past few years involves laboratory course alignment and modernization. Classes are in line with ACS recommendations. Experiments in some of these classes have still not been updated though. An extensive set of revisions were completed in CHM 414/514 in the past two years, however CHM 307 and CHM 204 have not undergone any major revisions, as anticipated, due to budgetary constraints.

Incoming Freshman Retention – Non-Chemistry Majors

Analysis of the freshman student experience in chemistry was begun two years ago. Non- chemistry major students attending first semester chemistry classes (CHM 151) have been required to complete the Toledo exam at the beginning of the semester. The Toledo exam, a forty question multiple choice exam, consists of 20 algebra questions and 20 basic chemistry questions. The first 20 questions (math concepts) have been utilized in an analysis for correlation between student's math skills proficiency and the low rate of student retention.

Exams for the Fall 2016 semester were administered to 335 students in the Fall 2016 sections of CHM 151 and CHM153. Data was collected and tabulated by lecture sections. Grades were converted to a numerical value based on table 1.

A clear correlation between the Fall 2016 semester students retention and the Toledo exam results was seen again as in the previous year. The Engineering Dept voluntarily decided, based on last year's retention results, to identify students before the beginning of the semester that would be at risk of failing or withdrawing from the freshman chemistry classes needed for their particular engineering major. As of the Fall 2016 semester, engineering students must complete or have proof of mastering the equivalent of MTH 148 to qualify register for CHM153/CHM151. Based on this decision, retention for the engineering students in CHM151/153 were at a record low for the Fall 2016 semester (Table 2).

The Medical Lab Science and the Biology Dept have not agreed on the need for a higher degree of math skills to be mandated for their students taking freshman chemistry and unfortunately the retention for this group of students have been much lower (Table 3).

Table 1:

Conversion of Letter Grade to Numerical Values (Num Value)					
Letter Grade	Num Value	Letter Grade	Num Value	Letter Grade	Num Value
A+	4.0	A	4.0	A-	3.6
B+	3.3	B	3.0	B-	2.6
C+	2.3	C	2.0	C-	1.6
D+	1.3	D	1.0	D-	0.6
		F	0.0		

Table 2:

	CHM 153		CHM 155
Lecture Section	01(Lawson)	02(Patel)	01 (Su)
Average Grade	2.6	2.9	3.1
Average Toledo Score	15.9	16.5	16.6
% students at risk	29.0%	10.0%	11.0%
% students with grade of W	3.6%	10.3%	13.6%
% students unable to continue to CHM 152	12.8%	0.0%	9.1 %
% students unable to continue **and** at risk	47.1%	0.0%	50.0%

Table 3:

Fall 2016 Semester – CHM 151			
Lecture Section	01 (Wei)	02 (Liberty)	03 (Silvia)
Average Grade	1.75	2.07	2.0
Average Toledo Score	13.7	14.3	14.1
% students at risk	59.0%	47.0%	47.0%
% students with grade of W	18.0%	37.0%	37.5%
% Students unable to continue to CHM 152	47.7%	49.2%	13.8%
% Students unable to continue **and** at risk	78.6%	53.1%	16.7%

Overview of Completed Assessment Plans

Laboratory Course Revisions – Non-Chemistry Majors

Revisions of freshman non major's chemistry labs, CHM 162, were completed in the Summer 2016. Laboratory experiments were modernized for the non chemistry majors. The CHM 162 lab manuals were updated and rewritten to include a modernized set of experiments utilizing the current instrumentation available in the freshman laboratories. Instructors found that the revised and new laboratory experiments were better integrated with the lecture portion of the course (CHM 162). Students were more often utilizing instrumentation in the labs that they might find in "real world" laboratory job settings, making the lab experience a more valuable experience for their future laboratory experiences at UMass Dartmouth and in a job environment.

Updates were also accomplished in the Organic laboratory. A significant amount of improvements were also completed in the Fall 2016 by Dr. D Olubanwo. Updating organic lab instruments, such as new high pressure liquid chromatography (HPLC) instrument, a polarimeter, a rotary evaporating system, a 96 well microplate reader, and software for other instrumentation was upgraded. The organic laboratory services both chemistry majors and non-chemistry majors.

Formal Learning Outcomes – Chemistry Majors.

Formal learning outcomes established by the Chemistry Dept and based on the American Chemical Society (ACS) guidelines were completed in 2016 and can be found on the UMass Dartmouth website. Since the last report, these outcomes have been simplified slightly. Students, current or potential, can access the curriculum requirements on the UMass Dartmouth website.

Laboratory Course Report Revisions – Chemistry Majors (writing assignments)

Implementation of the University Studies writing assignment 1C has been in effect since the Spring 2016 for the CHM 204. Dr B. Blanchette has continued to use the rubric grading form identified in the last year's assessment report for the formal reports and in-class writing assignments. Dr Blanchette has found that the rubric has been extremely helpful for students to successfully complete these writing assignments. Feedback the students have received included in these grading forms have helped students identify their weaknesses and strengths in writing assignments and understanding the construction of a peer reviewed article. Dr. Blanchette has also been successful in identifying problem areas in writing and understanding a laboratory experiment through the process of his concept of "Designing your own titration" writing assignment. He has found that the process of having to write an experiment has been extremely helpful for chemistry major students. It has been challenging for students to write an abstract and a procedure for the experiment in anticipation of a particular set of results. This writing assignment has helped to identify deficiencies and strengths in students reasoning skills.

Senior Capstone

The CHM 499 course, Senior Capstone, introduced in the Spring of 2016 has completed a year. I will need to send an addendum for the results update.

Assessment Committee Meeting / Future Assessment Committee Plans

The annual assessment committee meeting is scheduled for June 2017. I met with the Department Chair, Catherine Neto, in May 2017 to review the Assessment Committee's current goals and to consider new goals for the upcoming Fall 2017/ spring 2018 academic year, which includes the possibility of requiring all students planning to register for first semester chemistry (CHM151) to complete the Toledo exam with a 75% pass rate before registration. A possible exam opportunity for taking the Toledo would be during Orientation week.

Revisions to modernize the Analytical chemistry majors labs (CHM 204/307) and the freshman chemistry majors labs (CHM 155/156) experiment and instrumentation are of interest. Both lab revisions will be made as time and budget allows.

The next AQAD review for the Chemistry Dept is the academic year 2018-2019.

Department of Crime and Justice Studies
2016-17 Academic Year Learning Assessment Report
May 20, 2017

Submitted by Heather M. Turcotte
Assistant Professor of Crime & Justice Studies
Email: hturcotte@umassd.edu

Fall 2016 Progress

1. Reviewed other UMass Dartmouth departments' assessment reports and rubrics (Economics, English History, Philosophy, Political Science, and Women and Gender Studies);
2. Reviewed AQAD Handbook on Process and Procedures and the VALUE rubric from AAC&U;
3. Revised "Learning Outcomes" (Attachment A);
4. Revised "General Assessment Rubric" (Attachment A);
5. Developed draft assessment rubric for CJS 400 Capstone course (Attachment B1);
6. Identified and in-process of assessing two sections of Fall 2016 CJS 400 Capstone papers.

Spring 2017 Progress

1. Revised assessment rubric for CJS 400 Capstone to include University Studies Cluster 5A Questions with draft numerical sheet to track mean an median of each question (Attachment B2);
2. Completed pilot assessment of sample sections of Fall 2016 CJS 400 Capstone papers—data used to further discuss utility of assessment rubrics and need for improvements of rubrics;
3. Began review process of CJS 400 syllabi for meeting University Studies Cluster 5A requirements;
4. Continued discussion and (re)mapping of course classes to learning outcomes through data collected on assessment rubric.

Fall 2017 Plan

1. Acquire departmental approval of revised Learning Outcomes, General Assessment Rubric, and CJS 400 assessment rubrics.
2. Complete review of all CJS 400 syllabi for meeting University Studies Cluster 5A requirements and to (re)align learning outcomes and assessment rubric;
3. Identify and assess CJS 400 sections for the 2017-18 year;
4. Develop and approve learning outcomes and assessment rubric for CJS 257 (intermediate writing);
5. Identify and assess selection CJS 257 papers for the 2017-18 year;
6. Evaluate CJS 257 and CJS 400 in relationship to one another and pertaining to learning outcomes achieved and/or developed since CJS 257—consider written document for students "writing guidelines;"
7. Revisit earning assessments defined and data gathered for CJS 450;
8. Revisit assessment methods for CJS 190;

9. Discuss data collected and assess larger structural framing of departmental learning outcomes;
10. Return to the discussion on student portfolio collection and assessment of incoming and graduating majors to determine next steps as discussed in the 2015-16 Learning Assessment End of Year Report.

NEASC Questions

Have formal learning outcomes been developed?

Revised the Spring 2014 Learning Outcomes in Fall 2016, had lengthy departmental discussion regarding language of outcomes, awaiting departmental approval.

Where are these Learning Outcomes published? (Please specify & include URLs where appropriate.)

Abridged learning goals are published on our website:
http://www.umassd.edu/cas/departmentsanddegreeprograms/crimejusticestudies/

Had lengthy departmental discussion regarding providing full posting of Learning Outcomes on website, further discussion and decision in Fall 2017.

Other than GPA, what data/evidence is used to determine that graduates have achieved the stated outcomes for this degree? (eg. Capstone course, portfolio review, licensure examination…)

1. CJS 400 Capstone course assesses all seven of our learning outcomes;
2. CJS 450 Internship assesses application of CJS concepts to lived experience and workplace competency;
3. Currently reviewing strategies for assessing learning outcomes, including portfolio review, incoming and outgoing student surveys, and course-by-course assessments.

Who interprets the evidence? What is the process? (eg. Annually by the assessment committee)

The Assessment Committee interprets and documents the evidence. We assess individually on a semester basis and discuss findings as a department.

What changes have been made as a result of using the data/evidence?

CJS is in its infancy (founded in July 2013). We are in the process of collecting data/evidence to assess curriculum, construct student portfolios, and implement changes based on assessments.

Date of most recent program review (for general education and each degree program).

When CJS was part of the Department of Sociology and Anthropology, it underwent an AQAD review in April 2013.

To: Sarah Cosgrove

From: Anupama Arora and Karen Gulbrandsen, Assessment Co-Coordinators, English

Date: May 27, 2017

Re: ENL Assessment Final Report for AY 2016/17

In AY 2016-17, the Assessment Committee completed the following work:

- Piloted assessment for University Studies 1C courses (Arora and Gulbrandsen):

  - Defined/operationalized US 1C outcomes
  - Requested 3 papers from 27 sections (ENL 260, 264, 265, 266)
  - Received papers from 24 sections
  - Recruited 7 readers
  - Read and scored papers via Google Drive
  - Met with readers to discuss 1C and ENL learning outcomes and to revise rubric

- Piloted new ENL 259 exam (Arora, Hankins, Wilson, Zysk):

  - Lit faculty reviewed and revised the pilot exam
  - Prepared and administered exam
  - Scored results

- University Studies 5A Assessment (Arora, Eisenhart, Gulbrandsen, Zysk)

  - Met to define/operationalize US 5A outcomes and norm
  - Requested 3 papers from all Spring 2016 and Fall 2016 courses (5 sections)
  - Received papers from 4/5 sections
  - Read and scored papers via Google Drive
  - Met to discuss results
  - Reported results to University Studies (D. Roscoe, T. Stubblefield)

- Administered ENL 258 exit exam (Arora)

  - Prepared and distributed exam to each section
  - Scored results

- Organized meeting of ENL 257 faculty to review outcomes and norm curriculum (Eisenhart).
  ENL 257 Intro to Rhetorical Studies is a course required for ENL-Writing, Rhetoric & Communication majors and minors, and for Communication minors. The course is taught or may be taught by 8 different faculty members, with 2 to 3 sections offered per semester. For roughly a decade, the English department has assessed ENL 257 via an exit exam. The exam primarily has tested recall and application of the agreed upon key concepts and knowledge for the course. Intermittently, the faculty have come together to review the results of the assessment exam, and to revisit, review, and revise the assessment exam.

  This year, the ENL 257 faculty assembled to discuss the course, and its role as a foundation in the WRC curriculum. This discussion included some references to results from the assessment exam and the exam itself, but the focus of the

conversation was on the design and execution of the course. Faculty agreed to a list of shared concepts that should be central to all students' experience of the course, and upon which we should base the assessment going forward. Faculty also discussed assignments and texts that have worked (or not) for some or several instructors.

Actions items include a detailed report on the outcomes of the day, including recommended and suggested assignments and texts. Future actions also include updating the assessment exam, and revisiting the course descriptions for ENL 257 (reframe to focus on classical, rather than exclusively) and ENL 355 (upper level rhetorical theory—focus on contemporary, rather than exclusively).

Plan for 2017-18

- In AY 2016-17, we collected 3 sample papers from 3 Literature & Criticism courses and 3 Writing, Rhetoric & Communication courses. We have already developed a rubric. In AY 2017-18, we will read and score these papers, as well as understand results.

- Understand results of ENL 259 Pilot Exam (foundation course)

- Understand results of ENL 258 (foundation course)

- Assess ENL 260, 264, 265, and 266 for University Studies Cluster 1C assessment. Collect, read, and score 3 papers from each section (25 sections total).

Budget Support. At this time, the Assessment Committee has not requested support for assessment activities in 2017/18. The assessment committee requests budget for an assessment coordinator. We would also like to request $1200 ($300 each for 4 readers to read and score papers for 1C assessment).

To: Dr. Sarah B. Cosgrove, CAS Faculty College Assessment Coordinator
CC: Dr. Carlos Benavides, FLL Chair
From: Dr. Michelle S. Cheyne, FLL Assessment Coordinator
Date: May 22, 2017
Re: FLL Final Assessment Report 2016-2017, Appendices I-VI

Final Assessment Report 2016-2017
Department of Foreign Literature & Languages
University of Massachusetts Dartmouth

This is the annual end of the year report made by Michelle Cheyne, Associate Professor of French in her capacity as Assessment Coordinator for the Department of Foreign Literature and Languages (FLL) at the University of Massachusetts Dartmouth. In 2016-2017, FLL focused on two main goals for program assessment: the annual assessment of program learning outcomes and the completion of the AQAD periodic review.

Assessment Committee Composition, Calendar, and Agenda
Dr. Cheyne continued as Assessment Coordinator in 2016-2017. She led the department Assessment Committee that also includes Dr. Benavides, Chair of FLL, Dr. Christina Biron, Full Professor of Spanish, Dr. Stephanie O'Hara, Associate Professor of French, Dr. Marta Del Pozo, Assistant Professor of Spanish, and Mrs. Sandra Rivera, Full-Time Lecturer in Spanish and Director of Language Learning and Multimedia Center.

The Assessment Committee has traditionally met during our monthly department meetings and then worked in program breakout sessions for Spanish and French. In 2016-2017, the committee found that there was too much department business and too much assessment business to simply rely on combining the two and extra meetings were called as necessary, notably in October and November to discuss progress and drafting of the AQAD report and then in December to discuss the capstone requirement we had outlined for majors in French and Spanish. While the assessment work carried out by the French and Spanish programs will be discussed further, the French section met in December to conduct an exit interview with the graduating major and the Spanish section met to organize the assessment exercise carried out as part of the capstone seminar taught by Dr. Del Pozo. The Spanish section will be meeting after the date of this report to assess the learning outcomes. The results of that will be presented and discussed in either the September or the October 2017 faculty meeting.

While the original agenda for the committee in 2016-2017 was to focus on the AQAD self-study, report, and review, it became necessary to revisit and adjust the program assessment protocol defined in previous years.

The CAS Assessment Coordinator, Dr. Cosgrove was particularly helpful in helping FLL streamline our assessment protocol so that we gather the necessary information efficiently. In particular, she suggested that that sufficient evidence regarding program learning outcomes needed could be gathered by assess the entrance and exit interviews in conjunction with the final paper from the Spanish or French capstone. The committee discussed the suggestion at great length and concurred that this would be feasible. Given the relatively small number of majors, the data will need to be aggregated over time.

General Assessment Information for FLL Programs
FLL offers a major in French, a minor in French, a major in Spanish, and a minor in Spanish. For the purposes of Assessment, we are looking at the department learning outcomes described for the department and for majors in French and Spanish. As the university online catalogue indicates, the student learning outcomes for FLL programs (BA in French, BA in Spanish) are the following:

Learning Objectives for the Majors in French and Spanish

http://www.umassd.edu/cas/fll/programs/undergraduateprograms/languageprogramobjectives/

The language program is designed to help students achieve the following learning objectives:

1. *narrate in the past, in the target language*
2. *compare and contrast ideas, in the target language*
3. *analyse the aesthetic qualities of works of poetry, drama, fiction, and film, in the target language*
4. *state, explain, and support ideas, emotions, and opinions, in the target language*
5. *argue and persuade successfully, in the target language*
6. *engage in interdisciplinary research, in the target language*

Learning Objectives for French

http://www.umassd.edu/cas/fll/programs/undergraduateprograms/thefrenchprogram/

The French program is designed to help students achieve the following learning objectives in ways aligned with all five of the Standards of Foreign Language Learning as defined by the American Council on the Teaching of Foreign languages (see mission statement) and with current models of communicative and interactive competence that include discourse, actional, strategic, linguistic, and sociocultural components of language use:

-engage in interactions with speakers of French for a variety of purposes and in a variety of contexts, using socially and culturally appropriate forms for participating in conversations, establishing relationships with others, providing and obtaining information, expressing feelings and emotions, and expressing opinions.

-understand and interpret written and spoken language on a variety of topics and manifest growing awareness of the social and cultural influences shaping the production and use of knowledge in the French-speaking world

-present information, concepts, and ideas to an audience of listeners or readers on a variety of academic and non-academic topics.

Learning Objectives for the Spanish Program

http://www.umassd.edu/cas/fll/programs/undergraduateprograms/thespanishprogram/

The Spanish program is designed to help students achieve the following learning objectives in ways aligned with all five of the Standards of Foreign Language Learning (see mission statement) and with current models of communicative and interactive competence that include discourse, actional, strategic, linguistic, and sociocultural components of language use:

-engage in interactions with speakers of Spanish for a variety of purposes and in a variety of contexts, using socially and culturally appropriate forms for participating in conversations, establishing relationships with others, providing and obtaining information, expressing feelings and emotions, and expressing opinions.

-understand and interpret written and spoken language on a variety of topics and manifest growing awareness of the social and cultural influences shaping the production and use of knowledge in the Spanish-speaking world

-present information, concepts, and ideas to an audience of listeners or readers on a variety of academic and non-academic topics.

The current terminology on the website uses the term "objectives" in two different ways in these three separate descriptions. The sections presenting the objectives for the French Program and Spanish Program sections articulate the objectives in functional terms that align with language used in stating learning outcomes. The section explaining the objectives for majors in French and Spanish focuses on the linguistic skills needed to successfully perform the functional tasks. In 2017-2018, FLL might find it a good idea to consider where it wants to frame the student learning outcomes specifically as outcomes.

Adapting Assessment Procedures in AY 2016/17

FLL began developing its assessment plan several years ago when it began conceptualizing the framework for a portfolio project that would chart each student's individual progress and competencies from the moment the student entered the program right through degree completion. At the same time, in conjunction with AQAD, NEASC, and the development of University Studies, FLL has been working on mechanisms to evaluate the congruity of our curricula, student learning needs, and appropriate student learning outcomes for a university degree. While all effective assessment plans involve flexibility, reactivity, and adaptation, FLL has been working to establish a regular assessment program that will provide a basis for innovation and improvement to ensure excellence in student learning outcomes and to provide. To this end, in 2014-2015, the French and Spanish programs began working to identify the most appropriate courses to routinely study as well as the most appropriate artifacts to collect and study to assess student learning outcomes. At that time FLL drafted rubrics for these assessments. In 2015-2016, work began to implement these assessments.

Given the particularities of the FLL—two majors and the language learning sequences that are considered a service not a program—as well as the inherent focus on assessment in the field of foreign language acquisition, the department and CAS have worked hard to define the information needed regarding assessment of student learning outcomes for CAS programs. Discussion with the CAS Faculty College Assessment Coordinator, Sarah Cosgrove in 2015/16 and 2016/17 have been particularly useful in clarifying the most strategic and efficient way to provide CAS with information on on-going FLL assessment work.

During the December 2016 meeting, four major points were discussed: first, suggestions made by Sarah Cosgrove for streamlining the CAS assessment process; second, the student learning outcomes listed on the FLL website; third, internal assessment of student learning outcomes in all of the advanced courses; and fourth, the status of the "capstone" portfolio for majors.

In the special meeting in December 2016 for Assessment, the FLL Assessment Committee considered Sarah Cosgrove's suggestions for streamlining the process by focusing on the intake oral, exit oral, and a written sample of work in the form of a research paper in the capstone course as sufficient in providing the necessary data regarding student learning outcomes were discussed during the FLL department meeting devoted to Assessment Committee matters in December 2016. While provisionally adopted as a plan for AY 2016/17, FLL faculty members indicated their wish to debate this further before adopting it as a more permanent plan. Special attention was given by the committee to the language used to describe its student learning outcomes on the website. Given ambiguity created, the FLL Assessment Committee voted to change the description of student learning outcomes on its website. These changes were made to the website during the meeting. During this meeting, FLL faculty indicated that they wished to continue with internal assessment of student learning outcomes in advanced courses as a means of monitoring the impact of the curriculum on student learning. Such efforts are encouraged and applauded, but the results of these are internal and not the subject of this report. Finally, during this

meeting, the Chair of FLL and the Assessment Coordinator explained that since the FLL model for a "capstone" portfolio for seniors was not tied to a credit-bearing course, students could not be placed under any obligation to complete this portfolio. A graduating senior had challenged whether portfolio of past work and an extension of this with corrections and a bibliography could be required. The Dean's Office determined that this could not be required, especially since the FLL website did not state this as a graduation requirement. Discussion with the Dean's Office allowed FLL to explain that the samples of past work requested offer the department artifact that are useful for assessment of student learning outcomes. The student was willing to supply copies of past work, but the Assessment Committee discussed alternative options and it was reiterated that the work needed to be required work as part of a credit-bearing course.

Moving forward and in relation to suggestions made during the AQAD review, the Assessment Committee will consider Dr. Cosgrove's suggestion, to examine whether an external exit placement test might be adopted. The advantage to this would be the establishment of an official proficiency level (CERF, ILR, STANAG 6001, or ACTFL) that majors could use to frame their learning as a marketable asset in terms recognized by professional organizations and companies around the world. Further investigation needs to be done to determine what the cost of this would be and whether the core faculty sees this as a benefit.

Assessment and Student Learning Outcomes 2016-2017
In 2016-2017, the French program had one major who graduated, but as a double major. The student opted to take the capstone course in English. The French section met with the one graduating major for an oral exit interview in December 2016. A copy of the intake and exit interview prompts are included as Appendix II. This interview was recorded and along with the intake interview constitutes an artefact allowing us to assess X of the X learning outcomes under review. Drs. O'Hara and Cheyne reviewed and assessed the artefact. Given that there are only 1.67 full time faculty in French, the French program will determine in 2017-2018 a protocol that allows for two faculty members who are not the instructor of record to assess the artefacts as measures of student learning outcomes.

In 2016-2017, the Spanish section had three majors graduate. The three students enrolled in SPA 498 (Spanish Capstone), produced an interdisciplinary research paper and gave oral presentation. The presentations were given on April 18, 2017. The description of the project and the rubric for assessment are included as Appendix III. These provided the artefacts currently being assessed. The Spanish program will present the results and engage in a discussion of the results along with the rest of FLL at either the September or October department meeting. If the agenda of the department meeting is to full, there will be a separate Assessment Committee meeting called before the end of October 2017 to discuss the results of the 2016-2017 Assessment Exercise.

Overview of AQAD 2016-2017

Preparation for the self-study report for FLL began in Spring 2016. Core faculty divided the sections of the report addressing the five key criteria. Given that FLL has two programs (French, Spanish) offering minors and majors, and one strong college and university mission to provide language learning sequences in six languages (previously seven: Arabic, Chinese, French, German, Italian, Latin (now eliminated), and Spanish), FLL presented information on the French program, the Spanish program and the Language Learning Sequences since all require significant resources, all present a curriculum to be assessed, and contribute significantly to the college and university missions. Carlos Benavides (Spanish) and Michelle Cheyne (French and Language Learning Sequences) drafted Criterion 1. Christina Biron (Spanish), Stephanie O'Hara (French), and Michelle Cheyne (Language Learning Sequences) drafted Criterion 2. Marta Del Pozo (Spanish) and Michelle Cheyne (French and Language Learning Sequences) drafted Criterion 3. Christina Biron (Spanish), Stephanie O'Hara (French) and Michelle Cheyne (Language Learning Sequences) drafted Criterion 4. Sandra Rivera (Spanish), Stephanie O'Hara (French) and Michelle Cheyne (Language Learning Sequences) drafted Criterion 5. Associate Dean Karen Dixon provided feedback from the Dean's Office on this report.

Suggestions for potential external reviewers were made. The Dean's Office decided that Drs. Claudia Esposito, Associate Professor of French and Chair of the department of Modern Languages, Literatures & Cultures at UMass Boston, and Lilian Uribe, Professor of Spanish and Assistant Department Chair of the Department of Modern Languages at Central Connecticut State University would serve as appropriate external reviewers. The site visit was scheduled for February 27, 2017.

During the February 27, 2017 review, Drs. Esposito and Uribe came to the UMassD campus. They toured the campus to inspect our facilities and met with Dr. Benavides, the Chair of FLL. They also met with College of Arts and Sciences Dean, Dr. Jen Reilly; Provost and Executive Vice Chancellor for Academic and Student Affairs Mohammad Karim, and Vice Provost for Academic Affairs Magali Carrera; seven faculty members (four tenured faculty including the department chair, one tenure-track faculty member, and two non-tenure track lecturers), and six students who are majors and minors in the FLL programs. They also observed an upper-level Spanish class. They filed a joint report that reviewed the program and examined five main questions: whether the programs' goals and objectives are linked to the campus mission and strategic priorities; whether the programs' curriculum is relevant, rigorous, current and coherent; whether the programs' faculty meet standards of quality and productivity; whether the programs provide a teaching/learning environment that facilitates student success; and whether the programs use their resources wisely. Dean Riley wrote a memo responding to the review and FLL is currently drafting a response and action plan.

The AQAD 2016-2017 document is attached as Appendix IV. The AQAD Reviewers' Evaluation is attached as Appendix V. The Dean's Evaluation is attached as Appendix VI. An Action Plan is currently being drawn up and will be included in the September 2017 Assessment Coordinator's report.

<u>Projected Assessment Plan for 2017-2018</u>
The Assessment Plan for 2017-2018 will be drawn up in the September 2017 department meeting with all members of the assessment committee in attendance. On the agenda for the September and October meetings are discussion of results for 2016-2017 for the Spanish program. We will consider the results and whether it is already possible to identify of areas for remediation and articulate of an action plan. In 2017-2018, FLL will also discuss the action plan draw up after the 2016-2017 AQAD. Notably, there will be discussion about how restructuring the French program to reinvigorate it and make it more relevant to the current professional opportunities for graduates. We will also discuss options for proficiency testing and oral proficiency testing and funding for potential formats.

Appendix I – Response to NEASC Questions

i. Have formal learning outcomes been developed?

FLL has created formal learning outcomes the French and Spanish major. These were revised in Fall 2016 during the Assessment Meeting in early November. They are currently the following:

> ### <u>Learning Objectives for the Majors in French and Spanish</u>
>
> *The language program is designed to help students achieve the following learning objectives:*
>
> - *narrate in the past, in the target language*
> - *compare and contrast ideas, in the target language*
> - *analyse the aesthetic qualities of works of poetry, drama, fiction, and film, in the target language*
> - *state, explain, and support ideas, emotions, and opinions, in the target language*
> - *argue and persuade successfully, in the target language*
> - *engage in interdisciplinary research, in the target language*
>
> ### <u>Learning Objectives for French</u>
>
> *The French program is designed to help students achieve the following learning objectives in ways aligned with all five of the Standards of Foreign Language Learning as defined by the American Council on the Teaching of Foreign languages (see mission statement) and with current models of communicative and interactive competence that include discourse, actional, strategic, linguistic, and sociocultural components of language use:*
>
> *-engage in interactions with speakers of French for a variety of purposes and in a variety of contexts, using socially and culturally appropriate forms for participating in*

conversations, establishing relationships with others, providing and obtaining information, expressing feelings and emotions, and expressing opinions.

-understand and interpret written and spoken language on a variety of topics and manifest growing awareness of the social and cultural influences shaping the production and use of knowledge in the French-speaking world

-present information, concepts, and ideas to an audience of listeners or readers on a variety of academic and non-academic topics.

Learning Objectives for the Spanish Program

The Spanish program is designed to help students achieve the following learning objectives in ways aligned with all five of the Standards of Foreign Language Learning (see mission statement) and with current models of communicative and interactive competence that include discourse, actional, strategic, linguistic, and sociocultural components of language use:

-engage in interactions with speakers of Spanish for a variety of purposes and in a variety of contexts, using socially and culturally appropriate forms for participating in conversations, establishing relationships with others, providing and obtaining information, expressing feelings and emotions, and expressing opinions.

-understand and interpret written and spoken language on a variety of topics and manifest growing awareness of the social and cultural influences shaping the production and use of knowledge in the Spanish-speaking world

-present information, concepts, and ideas to an audience of listeners or readers on a variety of academic and non-academic topics.

ii. Where are these learning outcomes published? (Please specify & include URLs where appropriate).

The FLL learning outcomes are described in the 2016-2017 AQAD report and are also listed online in the university catalogue at the following web addresses:

http://www.umassd.edu/cas/fll/programs/undergraduateprograms/languageprogramobjectives/

http://www.umassd.edu/cas/fll/programs/undergraduateprograms/thefrenchprogram/

http://www.umassd.edu/cas/fll/programs/undergraduateprograms/thespanishprogram/

iii. Other than GPA, what data/evidence is used to determine that graduates have achieved the stated outcomes for this degree? (e.g. Capstone course, portfolio review, licensure examination…)

In addition to overall grade point average, the following data/evidence is currently collected to determine whether graduates have achieved the stated outcomes: entrance interview, exit interview, paper/presentation (presentation or exit interview) from capstone course in Spanish or in French. Beginning in Fall 2016, in Spanish, there will is a mandatory capstone course. The French program is developing a capstone course. It was decided to not go with the course proposal presented in Spring 2016, but rather to create a different one. To date, there has not been a French major who needed to fulfill the university capstone requirement in French because the student was a double major. The French program has debated how to address the issue of carrying out program assessment if there is not a mandatory capstone in French. The question of whether there should be a mandatory capstone in French was raised by students double-majoring who claimed it would be dissuasive to do two capstone projects. Given that capstone work can only be required in a credit-bearing course, it was decided in conjunction with the Dean's Office that it will be easiest to simply make the capstone course an obligatory part of the major.

Student learning outcomes for Spanish program or the French program and for the University Studies outcomes are measured according to the assessment rubric adopted by the department.

iv.   Who interprets the evidence? What is the process? (e.g. annually by the assessment committee)

The department members assess the artifacts collected and analyzed as part of our assessment of learning outcome exercises each year (annually/twice per year by the members of the assessment committee).

The FLL assessment committee comprised of department members assesses achievement of student learning outcomes for the artifacts collected. Students entering the major do an intake interview with two faculty members. Students graduating do an exit interview with two faculty members. These interviews and the paper from the capstone are assessed using the rubric by two faculty members who are, whenever possible, not the instructor of record for the course.

Discussion is underway for the possibility of eventually shifting to an official oral proficiency to establish a certified rating that the student can put on their professional vitae. FLL would need to determine which proficiency test and scale would be appropriate and how this might be administered and funded.

v.   What changes have been made as a result of using the data/evidence?

Given the small number of majors, we continue to aggregate data. FLL has responded to challenges in administering the program assessments and streamlined the process moving from a large capstone project that required extra work that was not in a credit-bearing course to a procedure that assesses the intake and exit interviews along with a written assignment from the capstone course. This is outlined above in the discussion included in the section "Learning Outcomes – ii".

vi. *Date of most recent program review (for general education and each degree program).*

FLL completed its most recent AQAD in 2016-2017. The results and recommendations are being discussed and work is underway to create an action plan to close the loop and use the information gleaned from the AQAD to improve the programs.

History Department
Assessment Activities
and
Assessment of Instructional Effectiveness
2016-2017

Cristina Mehrtens and Matthew Sneider

5/20/17

Part I
Student Learning Outcomes

Chronology	Broad familiarity with chronology reflecting on major themes of U.S., Western, or World History.
Bibliography – CMS	Use of bibliographic tools and databases to collect historical data in printed and electronic forms following the use of conventional forms in citation: the Chicago Manual of Style.
Critical Thinking	Identifies issues and problems, formulates questions, evaluates major debates, and develops thesis by demonstrating knowledge of history (U.S., Western, World).
Research	Conducts research effectively by interpreting primary and secondary sources.
Historical Argument	Presents a coherent and persuasive historical argument supported by primary and secondary sources.

Part II
Assessment Activities

On 5 October we held a departmental meeting entirely focused on assessment. We discussed the experience of collective assessment at the end of AY 2015-2016 contrasting what worked (the good response to our call for material) with what didn't work (the limited number of artifacts generated by one semester, artifacts which didn't cast light on all outcomes and a rather haphazard approach to marking papers). We also discussed a new version of our program assessment rubric, which we modified according to the suggestions of faculty.

On 7 October we met with the assessment coordinator to discuss last year's report and on 28 November we attended an assessment lunch meeting to compare notes with members of other departmental assessment committees. We were particularly intrigued by the discussion of post-graduate surveys, which we considered when we were crafting our original assessment plan and which we would like to propose to our colleagues.

On 26 April we held a departmental meeting where we presented our revised rubric and reminded our colleagues that we would be collectively assessing a sample of artifacts at the end of the semester. We also talked briefly about how to address the problems revealed by last year's assessment, which mainly had to do with clarity of writing and formatting of citations.

Finally, we collected artifacts in the form of final papers from all fall and spring sections of HST-201 and HST-400. Our "haul" of 85 artifacts was much larger than last year, totaling 45 papers for HST-201 and 40 papers for HST-400, although since some of these were turned in late we had available to us 27 papers for HST-201 and 35 papers for HST-400. We generated random samples of 6 papers and 5 papers, respectively, and distributed them electronically to all faculty in the department along with our rubric and instructions.

Five of us met on 17 May to compare our scores, discuss the results, and plan for future activities. The following three tables summarize the work of our assessors.

Part III
Assessment of Instructional Effectiveness: Data

Table 1: Summary of artifacts received and sampled.

Seminar	Quantity Received	Quantity Sampled
Seminar A	10	1
Seminar B	9	2
Seminar C	9	2
Seminar D	7	0
Seminar E (late)	5	-
Critical Skills A	27	6
Critical Skills B (late)	18	-

Table 2: Average scores for each SLO, for each artifact, by four evaluators.

Artifact	SLO 1	SLO 2	SLO 3	SLO 4	SLO 5
Seminar 1	2.25	2.5	2.25	2.75	1.75
Seminar 2	2.25	2.63	2.5	2.88	2.5
Seminar 3	2.13	2	2.25	2.63	1.63
Seminar 4	2.25	2.88	2.38	2.88	2.38
Seminar 5	2.88	3	2.25	2.38	2.13
Crit Skills 1	2	1.25	1	1	1.25
Crit Skills 2	3	3	3	2.75	2.75
Crit Skills 3	2	3	2.75	2.75	2.25
Crit Skills 4	2.25	2.75	2.5	2.75	2.25
Crit Skills 5	2.5	2.75	2.25	2	1.5
Crit Skills 6	2.25	2.75	1.75	2.5	1.5

Table 3: Average scores for each SLO by four evaluators.

Type	SLO 1	SLO 2	SLO 3	SLO 4	SLO 5
Seminars	2.35	2.60	2.33	2.70	2.08
Crit Skills	2.33	2.58	2.21	2.29	1.92

Part IV
Assessment of Instructional Effectiveness: Conclusions and Plans

The data from AY 2016/2017's assessment were generally encouraging, with numbers hovering between "emerging" and "proficient" (the overall averages were 2.26 for the critical skills class and 2.41 for the seminars). Although we would have liked to see higher averages, especially for the seminars, these are good numbers, and in line with what we saw in AY 2015/2016. With one or two exceptions, which exerted a notable downward pressure on the averages, we were quite impressed by the quality of the work we saw in the artifacts – we were particularly impressed by the breadth of the bibliographies and the accurate use of Chicago Style (not to mention some clever titles). We feel that the most significant outliers are the relatively low numbers for the fifth student learning outcome – historical argument. This is, we admit, a somewhat fuzzy outcome, involving as it does elegance of argument, persuasiveness in writing, and effective use of evidence. Despite its complexity, however, it is something that we, as historians, recognize, and we hope to foster this recognition in our students. When we return in the fall semester we will have a departmental meeting to discuss the results of this year's assessment and to strength faculty goals.

- General goals: 1) ensuring that students take the critical skills class early in their years as history majors; 2) ensuring that faculty have in mind departmental outcomes in formulating their course outcomes and in their evaluation of student work; 3) urging closer collaboration between the History Department, the Library, and the Writing Center in all upper division classes.
- Particular goals: developing common approaches to fostering students' ability to construct an effective historical argument. We could talk about how we scaffold writing assignments in our classes or how we engage students in the editing process (by editing sample assignments or by peer editing).

At the same meeting we will discuss a number of changes we would like to make to the outcomes and to the process of assessment.

- Revisiting the first outcome and thinking of how it might be framed so that it becomes assessable using the materials we are collecting.
- Making sure we collect materials only from history majors in both the critical skills class and the seminars.
- Drawing our sample differently, taking a random selection of materials from each course, in proportion to the number of artifacts in each course.
- Possibly extending the assessment and the discussion of results into the summer, for inclusion in the fall report.

To: Sarah Cosgove, CAS Assessment Coordinator, College of Arts and Sciences
Fr: Shari Evans, Liberal Arts Program
Re: Liberal Arts Assessment Report
Dt: May 19, 2017

a.   Overview of Assessment Plan for Department: timeline of outcome assessment and "closing the loop"

LAR Program assessment is generally focused on the two core courses in the major, LAR 201: Introduction to Multidisciplinary Studies, and LAR 401: Capstone Seminar in Multidisciplinary. We have been completing a rotation of LAR 201 and 401 paper assessment over a two-year cycle, along with artifact collection. Last year, we created a new assessment tool to address a missing link in LAR program outcomes, and this year we piloted the program, both collecting artifacts and conducting an initial review this spring.

LAR Major Outcomes

Demonstrates ability to use multidisciplin perspective and intra-disciplinary perspective	Conducts research that evaluates and employs primary and secondary resources (and research) effectively, using appropriate disciplinary conventions for citations and documentation.	Develop and write original analysis in clear, grammatical prose.

LAR outcomes are introduced in LAR 201, reinforced through the Concentration courses, and mastered in the LAR 401 capstone course. As a final assessment in both 201 and 401, students now write reflective essays that articulate and examine the distinct disciplinary focus, questions, and methodologies of their two concentrations, and discuss how they bring them together in a research-based writing assignment. Additional outcomes related to each concentration are tied to the disciplinary department of the concentration.

b.   Overview of Assessment Goals for 2016-17
and
c.   Identification and analysis of each assessment practice/tool implemented that includes:
i.   Outcome assessed
The focus for the assessment tool we are reviewing is on Outcome 1: Demonstrates ability to use multidisciplinary perspective and intra-disciplinary perspective.

As noted in earlier reports, "Earlier LAR 401 assessment shows that about 60% of students achieve "proficient" or "mastery" level in outcome 1 ("Demonstrates ability to use multidisciplinary perspective and intra-disciplinary perspective") and Outcome 2 ("Conducts research that evaluates and employs primary and secondary resources (and research) effectively, using appropriate disciplinary conventions for citations and documentation," with more closer to 70% achieving at this level of Outcome 3 (" Develop and write original analysis in clear, grammatical prose.")."

We are continuing to address the issues we noted in our 2015-16 report:
    In last year's report, we noted that

These results also indicate that there may be a flaw in the assessment—the assignment may not ask students to articulate their interdisciplinary approach, or may not clarify how they are engaging in more than one discipline. We are considering including a cover memo that would ask students to identify and articulate the disciplinary approaches they are using and why to better engage this outcome.

While we saw good improvement for Outcome 3 between LAR 201 and 401, we observed: The second outcome shows no growth from 201. We will evaluate how we are teaching research methods and integration of sources in both classes to address this. However, since the majority of student coursework takes place in the disciplinary departments between students' 201 and 401 experiences, the building of these skills is outside LAR control. We are working closely with English to align ENL 260 (the required LAR and ENL writing course) with LAR outcomes in research and argumentation.

ENL 260, the intermediate writing requirement for LAR, has been completely redesigned and is undergoing assessment in the English Department.

In response to these concerns, and during redesign of the capstone seminar to meet University Studies 5a requirements this fall, the assessment team developed a new set of reflection exercises to be used in assessing major outcomes in the bookended courses.

There are three main outcomes for the LAR major (noted above), and these are assessed in both the 201 and 401 course in an attempt to demonstrate growth. The concentrations are assessed within their disciplinary home. This year, we developed a new tool to be used in the two courses to better address Learning Outcomes #1 and #2.

For the LAR assessment in 2016-17, we continued with the assessment tool we created and revised last year. It focuses on metacognition.

ii.   Tool used

Continuing the pilot from spring 2016, LAR 201 and 401 courses this were asked to incorporate the following set of reflection exercises:

Assessment Proposal for LAR: Reflection portfolio

LAR 201
At the end of LAR 201, a letter to accompany the final 201 paper:

Write a letter that addresses the following:
- What are your two concentrations?
  - For Concentration 1, write 2-3 sentences that describe what you know about that concentration's focus and methodology.
  - For Concentration 2, write 2-3 sentences that describe what you know about that concentration's focus and methodology.
- Now, in terms of your paper:

- Identify your Concentration 1 approach to your topic (what methodology or tools are you using?)
- Identify your Concentration 2 approach to your topic (what methodology or tools are you using?)
- Discuss how you have brought these concentrations together—in methodology? In focus? In types of artifacts?
- What did you try to accomplish?
- What difficulty did you encounter?
- Finally, let's think about your undergraduate major moving forward:
  - How can what you've learned this semester and in writing this project guide you in creating your multidisciplinary major?
  - What classes do you want to take to moving forward?
  - How can they help you build your multidisciplinary perspective?

LAR 401
Write a reflective letter that addresses the following:

Now that you have completed your coursework in your two concentrations, revisit what you wrote in 201 and revise it taking into account your new knowledge and understanding:

- What are your two concentrations?
  - For Concentration 1, write a paragraph that describe what you know about that concentration's focus and methodology.
  - For Concentration 2, write a paragraph that describe what you know about that concentration's focus and methodology.
- Now, in terms of your paper:
  - Identify your Concentration 1 approach to your topic (what methodology or tools are you using?)
  - Identify your Concentration 2 approach to your topic (what methodology or tools are you using?)
  - Discuss how you have brought these concentrations together—in methodology? In focus? In types of artifacts?
    - What did you try to accomplish?
    - What difficulty did you encounter?
    - Did you end up focusing more on one concentration's methodology? Why or why not? How did you blend them?
- Now, talk a little about how you have grown or changed (as a learner, a thinker, a knower) over the course of your undergraduate education. Here you can talk about the major, about University Studies or CAS Distribution Requirements, about failures and successes.
- Finally, let's think about your multidisciplinary major as you enter life after college.
  - First, identify an audience: an employer? A graduate school program? A parent? An argumentative passenger on a bus who says "An LAR major? What's that???"
  - Now, write an 'elevator pitch'—that is . . .
    - First, describe your audience and scenario.
    - Next, in a brief statement (1 paragraph), articulate what your major *is* and what it *does*. That is, what have you learned through your distinct

disciplinary courses and through bringing them together? What skills do you have now and how are they valuable?

iii. Description of Evidence collected

We collected the reflection letters from each course. The LAR 201 reflection exercises will be both collected and stored to be redistributed to the students when they take the capstone, and we will also collect a sampling of LAR 201 final papers. At the start of the semester, students will be asked to return to that earlier assignment and to consider what has changed in their understanding of themselves and the major.

iv. Interpretation of results

The assessment committee met on May 11 to examine artifacts from both courses, and to review the assignment. We have not yet developed a rubric, because we are still focused on reviewing and assessing the assignment design. The assessment tool is designed to measure our learning outcomes, asking students to articulate the research methods within their chosen concentrations, to discuss how they have been integrated and employed, and to reflect upon their research and their major. For this pilot assessment, we read approximately 20 letters from LAR 201 and 30 for LAR 401.

In this pilot assessment, we learned that, on the whole, the assessment tool worked well. The revisions to the assignment have helped students more clearly address the learning outcomes for the major and to clearly (attempt) to articulate their methodological approaches. In the LAR 201 artifacts, students were beginning to identify the different ways in which a discipline may focus an area of study. While they were not always successful, 201 students clearly attempted this explanation. This was an improvement the instructor sees as tied to the improved assignment, and better integration of disciplinary language in the class. For 201, as noted in previous reports, students have not necessarily chosen their concentrations, and some fully intend to change majors (often into "reach" majors like nursing or engineering). Some of the artifacts are clear indicators of this intention, with students instead writing about their proposed major. This does not strike us as a negative outcome, since the students are articulating the value of their proposed path of study, even outside the major.

In the LAR 401 artifacts, similarly, there was improvement over the previous assessment. Students demonstrated that they could not only identify and apply clearly articulated disciplinary and multidisciplinary methods to a research project, but they could also examine the ways in which those different perspectives shaped their research. Additionally, they were able to articulate the value of that multidisciplinary perspective in their research and career and educational goals. The addition of more guided questions in the assessment tool helped students better understand and explain their projects, specifically in contextualizing their research. Learning outcomes and methodology questions have been more thoroughly integrated into the curriculum in both courses, to good effect. We found the assessment tool worked very well, allowing us to examine our students' understanding of the learning outcomes and to discuss how to better integrate the outcomes throughout the course.

We will continue the assessment tool as designed next year. In addition, we will continue to tweak the two courses to better prepare students for their final projects, and to better incorporate exploration and understanding of disciplinary and interdisciplinary methodology.

v.   Proposed plan-of-action
   Next year, we will develop a rubric to use in assessment, and pilot the rubric during the assessment process in the spring. One of the things we ask students to work on is an elevator pitch that articulates the value of their specific multidisciplinary degree. We want to see this developed a bit more and integrated more into the curriculum, and that will be an additional focus next year.

   LAR 201
   Proceed with the assessment tool as is, but work to integrate some of its parts earlier in the semester, including researching disciplinary perspectives and research questions.

   We do note that there is no expectation in LAR 201 that students will have already determined their concentrations before the start of the semester. However, a goal of the class is that students will have declared concentrations by its end, and will have begun to develop an idea and understanding of their chosen disciplines and their research focus.

   LAR 401
   We will continue with the LAR 401 assessment tool. LAR 401 course will also focus throughout the semester on having students identify and address disciplinary research questions and methodologies, and to think about how they make choices in their own projects of how to combine those perspectives and methods. Students will also identify methodology in the scholarship they read, as a way to make visible the structures of research and academic work.

d.   Plan for 2016-17
We will develop an assessment rubric for the artifact in the fall, collect artifacts from both 201 and 401 in fall and spring and assess both 201 and 401 assignments in the spring, testing the new rubric. The goal is to move to a two-year cycle of assessment, with one year assessing the letters and the next year papers.

LAR completed its AQAD review during the 2016-17 year, and will be involved in developing its AQAD response and Action Plan in the fall. This may slow down work in the fall.

NEASC questions:
a. Have formal learning outcomes been developed?
        YES
b. Where are these learning outcomes published? (Please specify & include URLs where appropriate).
    http://www.umassd.edu/cas/liberalarts/
c. Other than GPA, what data/evidence is used to determine that graduates have achieved the stated outcomes for this degree? (ex. Capstone course, portfolio review, licensure examination…)
    Capstone course; assessment of capstone papers; assessment of foundation-level papers; reflection exercises
d. Who interprets the evidence? What is the process? (eg. Annually by the curriculum committee)

The LAR Assessment Committee, made up of faculty, annually

e. What changes have been made as a result of using the data/evidence?
   Revision of rubrics for evaluation; revision of curriculum in foundation course

f. Date of most recent program review (for general education and each degree program).
   2016-17

LAR Major Requirements

- ENL 260: Intermediate Writing
- LAR 201: Introduction to Multidisciplinary Studies
- Concentration 1: 5 courses from concentration 1 requirements, including at least 3 at the 300-level at UMassD; 2.0 GPA in the concentration
- Concentration 2: 5 courses from concentration 2 requirements, including at least 3 at the 300-level at UMassD; 2.0 GPA in the concentration
- LAR 401: Capstone Seminar in Multidisciplinary Studies
- 2.0 GPA overall in the major
- **Note:** courses cannot count for both CAS distribution requirements and major requirements. That means, if a student chooses Sociology as a concentration, Sociology/Anthropology courses can no longer count for the CAS Social Sciences Distribution. Students choosing the English Literature concentration still have to complete the CAS literature distribution.

LAR Concentrations
*(I've * where a required course or pre-req could be easily transferred)*

- Art History
    - ARH 200: Visual Culture: Ancient, Medieval, World Art (ARH 125* and 150 *are pre-reqs for 200)
    - 3 300-level ARH courses
    - ARH 445: Seminar in Art History
- English Literature
    - ENL 258: Literary Studies (pre-req for upper-level courses)
    - Pre-1800 300-level historical course
    - Post-1800 300-level historical course
    - 2 Genre Courses at the 300-level
- English Writing, Rhetoric and Communications
    - ENL 257: Introduction to Rhetorical Theory
    - 1 300-level Genre Literature course
    - 3 300-level Writing courses (ENL 260 is a pre-req; some have additional pre-reqs)
- History
    - Both halves of a 100-level sequence: World, US, or European History (6 credits)*
    - 3 300-level courses
- Foreign Language (Spanish or French)
    - French: 301 & 302 (advanced composition sequence); 312: Culture & Civilization of France; FRN 331 or 332: Masterpieces of French Lit 1 or II; additional 300+ FRN course

- o Spanish: 301 & 302 (advanced composition sequence); 312 or 314 (culture/civilization of Spain or Latin America); 300-level SPN literature course; additional 300+ SPA course
- Philosophy
  - o PHL 101*
  - o 200-level Philosophy course*
  - o 3 300+ level Philosophy courses
- Portuguese
  - o Literary and Cultural Studies option
    - ▪ 200-level Portuguese literature in translation or film course*
    - ▪ 301 & 302: advanced writing courses
    - ▪ 310: Literary and Cultural Analysis
    - ▪ 300-level literature course (302 is the pre-req)
  - o Language and Linguistics Option
    - ▪ 301 & 302: advanced writing courses
    - ▪ Two writing courses: 303: Comparative Structures; 305 & 306: Translation and Business Writing
- Economics
  - o ECO 231 (Macro)
  - o 232 (Micro)
  - o 3 300-level ECO courses
- Political Science
  - o Two introductory courses: PSC 101 (American), 151 (Comparative), 161 (International Relations), 171 (Political Science Theory)*
  - o Three 300-level course, from at least two subfields (as listed in intro courses)
- Sociology/Anthropology (SOA)
  - o One 100-level introductory course: SOA 101 (sociology), SOA 111 (anthropology), SOA 113 (social and cultural behavior)*
  - o One SOA course at any level*
  - o 3 300+ level courses in SOA
- Sustainability Studies
  - o SUS 101 (Principles of Sustainability) or SUS 202: Topics*
  - o One SUS course at any level from approved list*
  - o 3 300-level SUS approved courses
- Urban Studies
  - o URB 201: City Life: Introduction to Urban Studies*
  - o URB-approved course at any level*
  - o 3 URB-approved 300+ level courses
- Women's and Gender Studies
  - o WGS 201: Intro to Feminist Theory (WGS 101* is a pre-req)
  - o 300-level Feminist Theory course
  - o 3 300-level WGS electives, with one from a non-Western perspective

Department of Medical Laboratory Science
Assessment Summary Report
AY 2016-2017 Assessment Report

Assessment Coordinator: James March Mistler

Assessment Committee: Frank Scarano (chair), James March Mistler (Program Director/Assessment Coordinator), Dorothy Bergeron

Assessment Meetings: At minimum, on a monthly basis, prior to any department meetings.

Activity	Purpose	Measured by	Metrics	Comments
CLS Outcomes Matrix Assessment	To determine the program's ability to achieve stated outcomes	See CLS Outcomes Matrix	See CLS Outcomes Matrix	• We have identified and made necessary changes to the Outcomes Matrix so the department has better assessment tools for the individual outcomes that were lacking. • Working on the last individual outcome.
Update Post-graduation student survey	To receive and respond to information from students on program outcomes	NA	NA	• Is used to assess recent seniors and compile data. • Going to information session to use new system in March 2017. • Completed
Instrument Enrichment proposal	• Enhance CLS Outcomes and provide additional hands-on skill development. • Increase student retention and success sophomore and junior years.	• Student and faculty surveys after program and after MLS 342 and 443 • Lab grades for all junior year classes	• Will be Pass/Fail • Comparison of grades for those in program and those not • Comparison of grades versus other years without enrichment program	• Program first ran students through in spring 2017. • Have since submitted proposal to turn program into degree required laboratory course that ran previously = Approved • First group: 10 pass/4 fail out of 14 students. • Second group: 12 pass/2 fail • Continue assessment for next 2 years.
Laboratory Math Review	• Many students do not understand basic laboratory math concepts by senior	• Senior year math exam	•	• We will be piloting a lab math binder that students will keep and add both notes and material to each

Prepared by: JMM

	year, so we are working to either build on our math concepts or increase math utilization in classes • This will increase student ability in seniors year exams and required board exams			semester so all math is easily accessible. • To start with new freshman class beginning of AY1718. • Senior lab math exam weight was increased to put more emphasis on its importance. Completed • Senior lab math exam will be also be given at the end of junior year and if students pass, may be exempt from taking it in fall as a senior. Completed/Changed • New lab math book being reviewed for appropriateness.

AY 1617 REPORT SUMMARY

- Finalized most of the assessment markers for the Outcomes Matrix with only 1 remaining.
- Enrichment program completed – 22 pass, 6 fail program. Will assess survey results from students and faculty for next 2 years.
- Enrichment program approved as new degree required course.
- Lab Math review is underway and new math binder pilot will start next year as well as assessing data from junior and senior lab math exams. Weight of exam was increased for more emphasis on the importance of exam and skills.

Memorandum

Date: May 18, 2017

To: Prof. Sarah Cosgrove, CAS Faculty College Assessment

From: Mathematics Department Assessment Committee

Subject: **Mathematics Department Spring 2017 Assessment Report**

The Mathematics Department Assessment Committee consists of Dana Fine
(Coordinator), Alfa Heryudono, and Sara Dalton

Overview

Three parallel tracks of assessment, "concept inventory", "broad" and "in-depth",
show consistent difficulties, and some hints of underlying concerns stemming from
placement, in meeting departmental goals (content knowledge, mathematical rigor,
and flexible problem solving) going back as far as the foundational first-year courses
for majors.

Activities 2016-17

The following summarizes the Committee's activities for 2016-2017:

- Prepare initial assessment plan (9/30)
- Meet with CAS Faculty College Assessment Coordinator (9/13)
- Meet as committee (Meet as a committee on schedule of Dept. Mtgs.)
- Revise assessment instrument(s) as needed. (10/30)
- Administer concept pretest in 100-level courses
- Determine courses to assess in Fall (11/15)
- Assess Fall courses (contact instructors 12/1)
- Prepare end-semester feedback report (12/11)
- Analyze results of Fall assessment and pre-test (1/21)
- Prepare mid-semester spring report (3/1)
- Determine courses to assess in Spring (3/31)
- Assess Spring courses (contact instructors 5/10)
- Analyze results of Spring assessment (5/24)
- Communicate findings to Department (5/25)
- Prepare final report (5/20)

Conceptual inventory

In the beginning of Fall 2016, the Department of Mathematics conducted preparedness assessment tests based on topics in algebra, pre-calculus, and calculus. As an example, students taking Calculus II in Fall 2016 were assessed on their understanding of concepts taught in Calculus I. There were 355 students in total (math and non-math majors) participating in the assessments. This is by far the largest number of participants compared to previous years. We achieved this by using WebAssign, a publisher-provided online homework and test system. The tests were designed to see whether students can recall basic mathematical concepts as opposed to calculations. They were NOT supposed to study for the tests. The results (median scores) are the following:

• Algebra: 80%
• Pre-Calculus: 39%
• Calculus I: 49%
• Calculus II: 51%
• Calculus III: 46%

While we do not want to over-analyze the statistics coming from a single simple online test, these scores do indicate that, except for those students entering non-STEM courses and College Algebra, fewer than half our students achieve the 60% conceptual mastery we would consider minimal preparation for the course they are about to start. Note in particular the low level of preparation for the remedial Pre-Calculus course that about half of the income STEM students must take to enter Calculus I, and the presumably *related* low level of preparation of students entering Calculus I.

This is consistent with the findings from our other assessments (see below – the discrepancy in the broad assessment from Calculus I and II is presumably due to the very low sample size in this assessment). It is also consistent with the long-term trends towards an increasing proportion of STEM students, up from one-quarter to nearly one-half, who fail the placement exam for Calculus I. For a student embarking on training in engineering, fourteen weeks of precalculus are rarely sufficient to make up for a lack of mastery of typically three or more years of high school mathematics. That a significant percentage of these students do end up prepared to succeed in Calculus I (previous assessments indicate the level may be as high as 20%) is surprising, and evidence for a high level of success in our attempts at remediation. However, the 39% median score is a reminder that even those who have satisfied the formal prerequisite for Calculus I may not be adequately prepared for the course. Unfortunately, in addition to placing these students in a difficult situation, this has predictable impacts on the level, pace and efficacy of all the courses in the four- semester sequence of calculus and differential equations.

This assessment provides a useful guide as to which conceptual problems our students are struggling with the most and thereby help our instructors to address them as appropriate in class. The Assessment Committee should do more to communicate the details of these findings back to the course instructors. Overall, WebAssign provides us with ongoing assessments for most lower-level courses without placing undue burden on the course instructors.

Broad assessments

Spring 2016 & Fall 2016:

We asked faculty in **all** courses to report the proportion of the students in their courses showing the Department's learning outcomes:

1. Content knowledge and skills: Students possess specific technical/analytical skills and conceptual understanding in core areas of mathematics including calculus, linear algebra, combinatorics, differential equations, advanced calculus (analysis) & modern algebra.
2. Context and modeling: Students understand the connections between different areas of mathematics and between mathematics and other disciplines; they understand the interplay between applications, problem-solving, and theory. Students use concepts and skills from the core areas to formulate mathematical models and solve multi-step problems. Students demonstrate knowledge of a discipline making significant use of mathematics.
3. Mathematical rigor: Students are able to reason rigorously in mathematical arguments. They can follow abstract mathematical arguments and write their own proofs.
4. Communication: Students are able to effectively communicate mathematics: reading, writing, listening, and speaking. Students make effective use of the library, conduct research and make oral and written presentations of their findings.
5. Computers: Students use mathematics software effectively. They are able to write programs or use software to explore, visualize and solve mathematical problems.
6. Flexible problem solving: Students are able to transfer the use of facts, concepts, and skills learned in a given context to solve problems in novel settings.

Results:

The following summarizes the numerical data (differences in count indicate the outcome was not a goal of a particular course or an instructor had no basis for assessing that outcome):

Spring 2016		1. Core content knowledge and skills?	2. Understanding modeling and the use of mathematics in context?	3. Mathematical rigor?	4. Their ability to communicate mathematics?	5. Their ability to use a computer as a mathematical tool?	6. Their flexiblity in solving problems?	7. What portion of your students showed adequate preparation for this course?
MTH100-149	Average	41%	50%	23%	36%	50%	39%	51%
	Stddev	27%	17%	14%	24%	20%	18%	20%
	Sections included	11	4	6	11	10	8	11
MTH150	Average	50%	50%	38%	78%		50%	**38%**
	Stddev	21%	21%	39%	18%		21%	39%
	Sections included	2	2	2	2	0	2	2
MTH151-199	Average	56%	44%	23%	50%	65%	56%	**50%**
	Stddev	27%	27%	18%	46%		27%	17%
	Sections included	4	4	**2**	4	1	4	4
MTH200-299	Average	55%	43%	**27%**	50%		35%	**23%**
	Stddev	17%	15%	14%	17%		0%	14%
	Sections included	3	4	3	4	2	4	4
MTH300-399	Average							
	Stddev							
	Sections included							
MTH400-499	Average	55%	65%	**27%**	65%	90%	**35%**	**35%**
	Stddev	17%	0%	14%	0%	0%	0%	0%
	Sections included	3	3	3	3	2	3	3

Fall 2016:

For which course are you completing this survey?		1. Core content knowledge and skills?	2. Understanding modeling and the use of mathematics in context?	3. Mathematical rigor?	4. Their ability to communicate mathematics?	5. Their ability to use a computer as a mathematical tool?	6. Their flexiblity in solving problems?	7. What portion of your students showed adequate preparation for this course?
MTH150	Average	36%	36%	27%	36%	63%	23%	36%
	Stddev	15%	23%	14%	15%	39%	14%	23%
	Sections included	4	4	3	4	2	4	4
MTH151-199	Average	50%	23%	23%	35%		23%	23%
	Stddev	21%	18%	18%	0%		18%	18%
	Sections included	2	2	2	2	0	2	2
MTH200-299	Average	55%	55%	10%	65%		55%	55%
	Stddev	17%	17%	0%	0%		17%	17%
	Sections included	3	3	1	3	0	3	3
MTH300-399	Average	78%	35%	50%	50%	90%	50%	35%
	Stddev	18%	0%	21%	21%	0%	21%	0%
	Sections included	2	1	2	2	1	2	2
MTH400-499	Average	84%	58%	72%	78%	90%	71%	64%
	Stddev	13%	15%	32%	14%	0%	13%	23%
	Sections included	4	4	3	4	3	4	4

Comments include that students find proof difficult, and that a student registered for a Capstone 400-level course was completely unprepared. (I hope this was a case of a student registering for the computational when they should have registered for another Capstone course.) It's striking that neither Calc III section reported the students being able to construct careful mathematical arguments as a goal in the course.

Some findings:
- The numbers suggest MTH150 Precalculus is only 23-50% effective. On the one hand, this is not surprising, as the course attempts to make up in 14 weeks for deficits in material normally taught in three years of high school mathematics. On the other hand, it is of significant programmatic concern as now more than half of our calculus students enter the sequence through MTH150. (Fifteen years ago, this fraction was closer to one quarter.) Note this is consistent with the 39% figure coming from the more detailed conceptual assessment described above.
- Strikingly, but not surprisingly, this falls off to lower levels at the 200-level and beyond. You would expect some adequately-prepared students to have difficulty, and few underprepared students to succeed. Because this persists,

due to the essentially cumulative nature of the curriculum, problems with the first-year courses are concerns for the program as a whole.

- Only 4 of 6 sections of courses in the calculus sequence (MTH151-154, MTH211 and MTH213) regard mathematical rigor as a targeted outcome of the course (and one to be assessed). This is likely to be part of the lack of preparation observed in upper-level courses for majors. Three factors may be at play here:

  a. As the department has moved from having tenured/tenure-track faculty to FTL and even PTL teaching the calculus courses there is a disconnect between what is taught at this level and what is expected as preparation in the upper-level. For instance, we have found instances where students in 300-level numerical analysis courses lack the conceptual understanding of the derivative required to understand how to approximate derivatives numerically. Likewise, students in higher-level courses have been observed to be unfamiliar with even the standard notation for essential functions such as the hyperbolic sine.

  b. Given the low level of preparedness of the students entering these courses, more abstract and consequently more difficult subjects may be dropped from the curriculum in order to give students more time to try to master basic calculational exercises.

  c. Math majors take these courses as a small minority in sections dominated by students in core engineering disciplines. This understandably influences the emphasis towards the more practical but away from the more fundamental topics, examples, exercises, and assessments.

In-depth assessments

We asked instructors teaching upper-level courses for math majors in the Spring 2016 semester to provide more detailed assessments of individual students' learning outcomes. The courses were the 400-level courses for majors, chosen to include graduating seniors in the Math, Computational math, and STEM accelerated MAT options. The instructions to the faculty members read:

To do this in a way that is minimally burdensome to you as faculty and to the students, the idea is to use the assessments we already undertake of student's progress in a given course, like exams, homework assignments, projects and class discussions, to provide assessments of the departmental learning outcomes for majors.

The format might be to describe the assessment you're using for a given outcome (or outcomes) and a "rubric" according to which you decide whether a given student has shown evidence of having achieved the desired outcome. Then, for each math major, you run through the evidence of whether he or she exhibits the desired outcome(s). This can be on a per student basis, or in

The assessment for the math option course is attached; the other two were not completed.

The findings in the one completed are consistent with the broader survey: a majority of graduating seniors have significant difficulty with mathematics beyond routine calculus. Their difficulties begin when they are asked to use routine calculus in multiple steps to solve extended problems, and intensify when they are asked to reason more abstractly and to provide proofs. Their communication abilities were uniformly high; this course did not in any way address their ability to use computers effectively in mathematics.

For Spring 2017 we are requesting of the relevant faculty that they base their assessment on the final paper or project in the U.S. Capstone course. We hope this more focused request will lead to a better response rate. Indeed, two of the three are already complete, and are attached.

The fundings from the in-depth assessments obtained thus far likewise highlight mathematical rigor and flexibility in problem-solving as the areas on which we need to focus improvements to the program.

Additionally, we have an assessment of learning in a highly unusual service learning course taught Fall 2016. The assessment is the least formal, but is unique in including comments of a faculty member from another institution. The results here suggest students are meeting the goal of applying what they have learned to do mathematical modeling and solve problems in areas of application, but that while they have met the oral aspects of the communication goal, they have serious difficulties in mathematical writing.

Closing the loop

That math majors are not getting the background they need, particularly a foundational understanding of calculus, was apparent in the 2014-15 assessment. This informed the Mathematics Curriculum Committee in their revision of the major. Specifically, they submitted a proposal that included revising the Calculus I, II & III sequence to create separate "Enhanced theory" sections for math and physics majors (and any other students with sufficiently high scores on the calculus placement exam). They also proposed to create a new discrete math course specifically to meet the needs of incoming majors. (The two-semester discrete math

sequence currently required is populated mostly by computer science majors, who do not need the emphasis on proof that would be appropriate for math majors.)

However, this attempt to feed results from our assessments back into curriculum revisions was rejected by the Provost's office. The feedback noted the changes would not be cost-neutral.. A curriculum revision that does not contain these changes was eventually approved. The result is the Department was unable to implement changes to address the shortcomings we discovered through the assessment process.

The Search and Screen Committee charged with hiring an FTL in 2015-16 was instructed to require a Ph.D. in mathematics and experience teaching courses for math majors through the sophomore level as job requirements. This was an attempt to bridge the inferred gap between expectations of faculty teaching upper-level math courses and the FTL's teaching the calculus sequence. It also addressed our current shortage of instructors able to teach at the sophomore level, which has arisen as tenured faculty have been replaced by FTL's. The hope was to hire people with the training and background to be tenure-track faculty, and who are devoted to teaching, but who happen not to be interested in continuing a research career. This search failed.

Eventually two such FTL's were hired over the summer. Unfortunately, one is already leaving for a tenure-track position at another institution.

The Department has not come up with new ideas for how to improve the foundational courses for math majors without incurring additional costs. Noone stepped forward to apply for possible funding through a new CAS initiative to provide funds to "close the loop", so we do not know whether our proposed changes could be implemented in a future curriculum revision. In part, this is a chicken-and-egg problem as the new courses could only become part of the program in the context of a revision of the major, which noone is willing to take on so soon after completing the last one.

Plan for 2017-18

The Assessment Committee tentatively plans to continue the conceptual assessment in the fall, the twice-yearly broad assessment, and the ind-depth assessment of the Capstone courses. These plans are only tentative, as the current Coordinator will be on sabbatical leave, and we do not wish to impinge on the authority of the new Coordinator.

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Mathematics majors' learning outcomes
MTH451 Spring 2017

Outcomes assessed and assessment tools

This assessment of learning in the U.S. 5B Capstone course is based on the students' final projects, as well as their overall course performance (semester grades). There were 7 mathematics majors in this course, all seniors. The final project counted for 40% of the course grade. Six homework assignments factored in for 20% of the grade, and the remaining 40% was an in-class midterm exam.

The learning outcomes assessed (detailed description are the Department's published list) were

1. **Core content**: Differential geometry draws on what students have learned from linear algebra (matrices, determinants, linear transformations, eigenvalues, bases, orthogonality), calculus (it is a direct extension of Calculus III), differential equations (including subtle applications of existence and uniqueness theorems) and real analysis. Student products were judged based on evidence of mastery of the core content from these earlier courses.
2. **Context and modeling:** Techniques learned in the above courses are applied in a context that can be described as understanding how maps of a physical surface reflect the geometry of that surface. In some of the projects, students opted to explore additional applications to architetural design, computer rendering of solids, and actual cartography.
3. **Mathematical rigor:** Throughout the semester, homework problems on each topic asked for mathematical proofs. Their final project assignment asked them to fill in details of proofs.
4. **Mathematical communication** (written and oral): Students were expected to participate in class discussions. Those who wrote papers on applications gave an oral presentation.
6. [1]**Flexible problem solving**: Many of the homework problems, and the majority of those some students opted to solve as their final project, were not routine permutations of problems solved in class or in the textbook.

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[1]In this course students used computer technology in their written and oral communication, but not explicitly in understanding the mathematical content; hence learning outcome number 5, which refers to the use of computers to understand mathematics was not assessed here.

Results

MTH451 Learning outcomes Spring 2017

	Content	Context	Rigor	Communication	Flexibility	Average by student	Course grade
Student 1	2	1	1	2	0	60%	C+
2	2	1	0	0	1	40%	C
3	2	2	2	2	1	90%	B+
4	2	2	2	2	1	90%	A-
5	2	2	2	2	2	100%	A+
6	1	1	0	1	1	40%	C+
7	2	1	1	1	0	50%	C
Outcome average	93%	71%	57%	71%	43%		
Outcome standard deviation	19%	27%	45%	39%	35%		
Overall average	67%						
Overall standard deviation	36%						

As the above table indicates, the program shows overall success in the outcomes assessed for about half the students. Specifically, the program shows clear success in with three students, borderline success with two, and only limited success with two students.

Looking at the individual outcomes, it is clear that the areas of particular weakness are mathematical rigor and flexibility in problem solving. These are, respectively, the most difficult aspect of mathematics for students to learn, and the most difficult aspect for faculty to teach. (The distinction is for the former we, as faculty, have many strategies for teaching, but students often fail to learn via any of them, while

the very nature of flexible problem-solving begs the question of how to attempt to teach it.)

Overall conclusions

That over 40% of the students in a capstone course covering most of the desired outcomes perform well is encouraging. That over 30% show significant shortcomings, and that these may be present from relative early in the program is cause for serious concern. Clearly, *we need to ensure that even our calculus courses expose students to problems requiring multi-step problem-solving, careful mathematical reasoning, and the transfer of calculational skills from one context to another.*

DEPARTMENT OF MATHEMATICS

STUDENT LEARNING OUTCOMES

MTH 487 MATHEMATICAL INQUIRY I

UNIVERSITY STUDIES CAPSTONE, FALL 2016

INSTRUCTOR: GARY DAVIS

Below is a list of expected student learning outcomes for students enrolled in the mathematics major or minor. The Department of Mathematics is committed to fostering continual improvement in student learning, guided by regular assessment of student achievement in regards to the listed learning outcomes.

1. **Content knowledge and skills**: Students possess specific technical/analytical skills and conceptual understanding in core areas of mathematics including calculus, linear algebra, combinatorics, differential equations, advanced calculus (analysis) & modern algebra.
2. **Context and modeling**: Students connect different areas of mathematics and mathematics with other disciplines; they effectively use the interplay between applications, problem-solving, applying what they know from one realm to answer questions from another. Students use concepts and skills from the core areas to formulate mathematical models and solve multi-step problems. Students demonstrate knowledge of a discipline making significant use of mathematics.
3. **Mathematical rigor**: Students are able to reason rigorously in mathematical arguments. They can follow abstract mathematical arguments and write their own proofs.
4. **Communication**: Students are able to communicate mathematics: reading, writing, listening, and speaking. Students make effective use of the library, conduct research and make oral and written presentations of their findings.
5. **Computers**: Students are able to write programs or use mathematical software to explore, visualize and solve mathematical problems.
6. **Flexible problem solving**: Students are able to transfer facts, concepts, and skills learned in a given context to solve problems in novel settings.

This learning outcomes assessment is based on student products submitted throughout the Fall 2016 semester. Most student products are available via the links at https://mth487.wordpress.com/about/07-class-list

Student work was assessed in relation to the 6 learning outcomes listed above on a 3-point scale: 0 = Not evident, 1 = Somewhat evident, 2 = Strongly evident.

Learning outcomes were assessed from student products as follows:

1. **Content knowledge and skills**. Project 1: Knowledge of trigonometry, recursive definitions, matrices. Project 2: Properties of logarithms. Project 3: Knowledge of permutations. Project 4: Knowledge of integer sequences. Project 5: Knowledge of exponential functions, properties of plane graphs. Project 6: Knowledge of plane geometry.
2. **Context and modeling**. Project 1: using coding to produce graphic objects. Project 2: Statistical modeling of data. Project 3: Modeling patterns via combinatorial properties. Project 4: Modeling sets of integers by functions. Project5: Modeling combinatorial problems with plane graphs.
3. **Mathematical rigor**. Project 1: Proof of Cassini's identity for the Fibonacci numbers. Project 2: Proof that nth Fibonacci number is nearest integer to $\frac{\varphi^{n+1}}{\sqrt{5}}$ where $\varphi = \frac{1+\sqrt{5}}{2}$. Project 4: Proof that $n + \sqrt{n}$ never rounds to a square. Project 5: Graph-theoretic proof of smallest number of moves for 3-peg Tower of Hanoi problem. Project 6: Proof that regular pentagons do not tile Euclidean plane. (Extension: proof that convex polygons that tile the Euclidean plane have ≤ 6 sides – hard).
4. **Communication**. Written accounts of project work, 6 projects in all, plus a final course summary paper, were posted on students' individual websites throughout the semester. These were judged for their communicative characteristics through content, clarity, coherence, and comprehensiveness.
5. **Computers**. Computational work was carried out via *Mathematica*, and this occurred in Project 1: Arctangents and the spiral of Theodorus; Project 2: Benford's law; Project 4: functions that omit specified sets of integers; Project 5: 3 and 4 peg Tower of Hanoi; Project 6: Tessellations and tilings of the plane, sphere, and hyperbolic plane.
6. **Flexible problem solving**. All 6 projects involved flexible problem solving, in that each project required students to bring their prior mathematical knowledge to bear on novel problems. Students' ability to utilize flexible problem solving was tested especially in Project 2, which dealt with devising reasonable statistical models in unusual data; Project 3, which with dealt with combinational and topological properties of self-intersecting closed planar curves; and Project 6, which dealt, in part, with tilings of the hyperbolic plane

RESULTS

STUDENT	STANDING	Content	Context	Rigor	Communication	Computers	Flexibility	Student total/12	Student z-score
STUDENT LEARNING OUTCOMES, DEPARTMENT OF MATHEMATICS, MTH 487 FALL 201
1	Junior	2	2	2	2	2	2	12	1.4
2	Senior	2	2	2	2	2	2	12	1.4
3	Senior	2	2	2	2	2	2	12	1.4
4	Senior	2	2	1	2	2	2	11	1.1
5	Senior	1	1	2	2	2	2	10	0.8
6	Junior	2	2	1	1	2	1	9	0.5
7	Senior	1	2	1	1	2	1	8	0.2
8	Senior	1	2	1	1	2	1	8	0.2
9	Senior	1	1	1	1	2	1	7	-0.1
10	Junior	1	1	0	1	2	1	6	-0.4
11	Senior	0	1	1	1	2	0	5	-0.7
12	Senior	0	0	1	1	2	1	5	-0.7
13	Senior	0	1	0	1	2	0	4	-1.0
14	Senior	0	1	0	1	2	0	4	-1.0
15	Junior	0	0	0	1	2	0	3	-1.4
16	Junior	0	0	0	1	2	0	3	-1.4
	TOTAL (%):	47%	63%	47%	66%	100%	50%		
	AVERAGE:	0.9	1.3	0.9	1.3	2.0	1.0	7.4	
STANDARD DEVIATION:		0.9	0.8	0.8	0.5	0.0	0.8	3.3	

DISCUSSION

The focus of this course - problem solving for prospective secondary teachers of mathematics – is such that the problems dealt with in the course are elementary. What that means, mathematically speaking, is that the problems can be tackled without any detailed specific knowledge. It does not mean they are easy, and each project had at least one quite substantial mathematical difficulty attached – difficult enough to give a Ph.D. mathematician pause to think.

By its nature, the course utilized computational technology for all but one project, so the high scores for use of computers is sort of obvious.

Rigor, and flexible problem solving were emphasized throughout the course, and by and large there is much room for improvement in both these areas. Of course, in a capstone course such as this students are generally demonstrating their existing levels of rigor, which have been addressed in prior courses such as discrete mathematics, linear algebra, advanced calculus, and modern algebra.

Students' written communication skills could be improved substantially, and this could be addressed in this course, and in prior courses, by examples of, and templates for, well-written mathematical papers.

Content knowledge & skills was a big surprise for me in this course. To some extent one does not expect higher level mathematical skills to be demonstrated in a capstone course of this nature. However, the lack of demonstrated lower level mathematical skills was disappointing and probably indicates how students do not recall their basic mathematical training when placed in unfamiliar, yet elementary, problem settings.

Note that most students were able to answer questions 1 and 8 which depended on a fairly direct application of their background knowledge of freshman and sophomore level calculus. A substantial percentage correctly answered question 3, which combined this with an extended line of reasoning involving multiple steps. Question 3 pushed this further, combining the calculus with some intricate mathematical reasoning; only some students could manage this in the setting (which required accuracy and fluidity). The poor performance of many students on Questions 4 and 5 most likely reflects difficulty in close reading. Some were able to get the gist of Question 6, which was purely a matter of using a theorem correctly in a mathematical argument. (It was somewhat subtle in depending on the uniqueness

Assessing math majors learning outcomes in MTH451 (Spring 2016)

Outcomes assessed and assessment tool

This assessment is based on student responses to the attached in-class midterm exam, as well as their overall course performance (semester grades). There were 13 mathematics majors in this course (11 seniors, 2 juniors). This was a capstone course, culminating in a paper (based on their reading of areas of application of differential geometry) which counted for 40% of the final grade. Six homework assignments factored in for 20% of the grade, and the balance was the midterm.

The outcomes the exam assesses (the numbering is taken from the Department's published list) are

1. Core content
2. Context and modeling
3. Mathematical rigor
4. Mathematical communication (written)
6. Flexible problem solving

The attached annotated exam shows the breakdown of which question assesses which outcome(s). (Note that all require the student to interpret the questions and write their answers and hence address outcome 4.)

Results

From the midterm exam

The attached table gives the item-by-item scores, and the average score on each question. Scores of 7 or higher on a given question indicate the student answered essentially correctly (lower scores within that range reflect minor errors, usually in calculation), while scores of 3 or below indicate the student was not able to answer the question (higher scores indicate some correct work of some relevance). A sample graded exam (from student 8) is attached. The final row gives the (rounded) percentage of students who answered the corresponding question correctly.

Note that most students were able to answer questions 1 and 8 which depended on a fairly direct application of their background knowledge of freshman and sophomore level calculus. A substantial percentage correctly answered question 3, which combined this with an extended line of reasoning involving multiple steps. Question 3 pushed this further, combining the calculus with some intricate mathematical reasoning; only some students could manage this in the setting (which required accuracy and fluidity). The poor performance of many students on Questions 4 and 5 most likely reflects difficulty in close reading. Some were able to

get the gist of Question 6, which was purely a matter of using a theorem correctly in a mathematical argument. (It was somewhat subtle in depending on the uniqueness statement within the theorem.) Very few students could manage the problems asking for flexible problem-solving even using first-year calculus, and those asking for anything from the more advanced parts of the undergraduate curriculum.

Students	Hq 1	Hq 2	Hq 3	Hq 4	Hq 5	Hq 6	Hq 7	Hq 8	Hq 9	Percent
1	10	0	1	0	1	10	0	3	0	28
2	10	8	2	9	2	7	3	9	0	56
3	10	10	10	10	10	10	9	10	10	99
4	8	4	1	0	0	0	3	8	0	27
5	7	3	3	0	1	1	1	0	0	18
6	7	4	0	0	0	1	0	1	0	14
7	9	1	3	0	2	2	3	10	0	33
8	6	1	1	0	0	3	8	9	0	31
9	10	8	7	2	3	1	3	8	0	47
10	10	2	0	1	6	3	1	6	3	36
11	10	10	9	3	2	0	4	10	0	53
12	10	1	3	0	0	1	3	9	10	41
13	10	10	4	0	5	3	2	10	3	52
Average	9	4.8	3.4	1.9	2.5	3.2	3.1	7.2	2	41
% 7+	100	38	23	15	8	23	15	77	15	

From course grades

The course grades were 2 A's, 4 B's and 4 C's. These reflect a weighted average of assessments in 5 of the 6 learning outcomes listed above. (There was no expectation of using technology to do mathematics in this course.) We can be quite confident the

program succeeded in its goals with 2 of the 13 students, and equally confident it was at best marginally effective with 4 of the 13. Reference to the midterm exam suggests a significant fall-off as students move into more abstract mathematics, and into situations where the problems they must solve are more complex.

Overall conclusions

That over 15% of the students in a capstone course covering most of the desired outcomes perform well is encouraging. The sample size is too small, however, to infer this is a representative number. That over 30% show significant shortcomings, and that these may be present from relative early in the program is cause for serious concern. (This sample is large enough to be confident that at least 15% are in this category.) Clearly, *we need to ensure that even our calculus courses expose students to problems requiring multi-step problem-solving, careful mathematical reasoning, and the transfer of calculational skills from one context to another.*

The midterm exam

MTH451/551   Midterm exam
Spring 2016
Prof. Fine

Please write clear and preferably correct answers in your bluebook. Show enough work to allow me to follow your reasoning. Refer to notes or the text explicitly where appropriate. Each question carries equal weight.

Questions 1 to 3 refer to the parametrized curve $\alpha(t) = (e^{-t}\cos t, e^{-t}\sin t, e^{-t})$ for $t \in (0, \infty)$.

1. Is α a regular curve?

1. Calc I, III

2. Let $s(t_0)$ be the arc length of α between $t = 0$ and $t = t_0$. Evaluate $\lim_{t_0 \to \infty} s(t_0)$ (or show it does not exist).

1. Calc I, II
2.

3. Reparametrize α by arc length.

1. Calc I, III
2.

Questions 4 and 5 refer to the following two curves: Let α be a unit-speed regular curve, with positive curvature, and with the property that its torsion is a constant c times its curvature. Define a new curve β by $\beta(s) = \int_0^s \mathbf{N}_\alpha(\bar{s})\, d\bar{s}$, where $\mathbf{N}_\alpha$ is the normal vector of α.

4. Show that β is parametrized by arc length.

2.
3.

5. Calculate the Frenet-Serret apparatus $(\kappa_\beta, \tau_\beta, \mathbf{T}_\beta, \mathbf{N}_\beta, \mathbf{B}_\beta)$ of β in terms of the Frenet-Serret apparatus $(\kappa_\alpha, \tau_\alpha, \mathbf{T}_\alpha, \mathbf{N}_\alpha, \mathbf{B}_\alpha)$ of α. (Do not assume α has constant curvature.)

2.
3.
6.

6. Use the fundamental theorem of curves to prove that a regular curve α with constant non-zero curvature and constant torsion must be a circular helix. (Hint: You may quote calculations from Example 3.2 in Chapter 2.)

3.

The remaining questions refer to the map $\mathbf{x} : (-\pi, \pi) \times (-\pi, \pi) \to R^3$ given by $\mathbf{x}(u, v) = ((4 + \cos u)\cos v, (4 + \cos u)\sin v, \sin u)$.

7. Show that this is a C^1 coordinate patch. (In fact, it is C^k for all k, and proper.)

1. Calc, Adv. Calc.

8. Calculate the normal to the tangent plane at the point $\mathbf{x}(0, \pi/6)$.

1. Calc I, III

9. Find the inner products $\langle \mathbf{x}_i, \mathbf{x}_j \rangle$ as functions of u and v for all allowed pairs i and j.

1. Calc I, III
2.

1) $\vec{x}: (a,b) \to \mathbb{R}^3$ class C^k $k \geq 1$

$\vec{x}(t) = (e^{-t}\cos t, e^{-t}\sin t, e^{-t})$

$\frac{d\vec{x}}{dt} \neq \vec{0}$

$\frac{d\vec{x}}{dt} = (e^{-t}\sin t, -e^{-t}\cos t,) \times$ Produ

at high values of t, e^{-t} approaches zero, for example $\approx 1.374 \, e^{-27}$. So I would say that not a regular curve since the li approaches the $\vec{0} \times$ On the interval it is non Q:

2) The arc length does not exist because we cannot integrate

$\vec{0} \times \int_0^{t} |d\vec{x}/dt| \, dt$

or $s(t) = \sqrt{2} \; e^{-t} = \sqrt{2} e^{-t}$

28/90

3) $|\vec{\alpha}'| = \sqrt{2o^{2t}}$

$\int_0^t \sqrt{2}\, e^t = \sqrt{2}\, e^t = S(t)$

If true, what would come next?

$\vec{\alpha}$ unit speed regular curve κ
with positive curvature $\tau = C(\kappa\beta)$
$\beta(s) = S_0^s\, N_\alpha(\bar{s})d\bar{s}$, where N_α is +
vector $\vec{\alpha}$
How can we determine without

4) $\vec{\alpha}$ is unit speed regular so

$\left|\dfrac{d\vec{\alpha}}{dt}\right| = 1$

$\beta(s) = S_0^s\, N_\alpha(\bar{s})d\bar{s}$

$\bar{N}_\alpha = T'(s)/K(s)\kappa$

$T = N \times B$

$N = B \times T$

$B = T \times N$

22

$$\begin{bmatrix} \cos\omega t & \sin\omega t & 0 \\ 4\sin\omega t, & r\cos\omega t, & h \end{bmatrix}$$

(b) Circular helix is of the form

$(r\cos t, r\sin t, ht) = \vec{\alpha}$ this would be

regular because h is constant

Say there was another constant ω

such that $\vec{\alpha} = (r\cos\omega t, r\sin\omega t, h\omega t)$

So $\frac{d\alpha}{dt} = T = \omega(-r\sin\omega t, r\cos\omega t, h)$

$T' = -\omega^3 r(\cos\omega t, \sin\omega t, 0)$

And because $K(t) = |T'| = -\omega^3 r$ **‼**

$K(t) = -\omega^2 r$ which is a constant

curvature.

$N = T'/K_3 = (\cos\omega t, \sin\omega t, 0)$

$B = N \times T = (\cos\omega t, \sin\omega t, 0) \times (r\sin\omega t, r\cos...$

$B = (\sin\omega t, \cos\omega t, 1)$ $B' = (\cos\omega t, \sin\omega t...$

torsion $= \tau = -\langle B', N\rangle = (\omega^2\cos^2\omega t + \omega^2 \sin^2\omega t + 0$

$= \omega^3 h(1) = \omega^3 h$

So τ is also constant.

So, if you assume α is a circular helix, then

you can conclude K & τ are constant

3

$\vec{x} : (-\pi, \pi) \times (-\pi, \pi) \to R^3$

$\vec{x}(u,v) = ((4+\cos u)\cos v, (4+\cos u)\sin v, \sin u)$

7) Coordinate patch if One-to-one C^k function

$\vec{x} : U \to R^3$ for some $k \geq 1$ where U is an

open subset of R^2 with coordinate u^1, u^2.

and $\vec{x}_1 \times \vec{x}_2 \neq 0$ on U

C^1 if 1st derivative exists ad is continuous

$\vec{x}_1 = (-\sin u \cos v, -\sin u \sin v, \cos u)$

$\vec{x}_2 = (-4 \sin v - \cos u \sin v, 4 \cos v + \cos u \cos v, 0)$

$$\vec{x}_1 \times \vec{x}_2 = \begin{vmatrix} e_1 & e_2 & e_3 \\ \sin u \cos v & -\sin u \sin v & \cos u \\ -4\sin v - \cos u \sin v & 4\cos v + \cos u \cos v & 0 \end{vmatrix}$$

$= (-(4\cos v \cos u + \cos u \cos v), (4\cos u \sin v + \cos^2 u \sin v),$
$\quad -4\cos^2 v \sin u - \cos u \sin u \cos^2 v)$

$$|\vec{x}_1 \times \vec{x}_2| = \sqrt{}$$

$\to \vec{x}_1 \times \vec{x}_2$ ever 0? $\vec{x} \neq 1, -1$?

$\nearrow$ squared and added

8) $\hat{n} = \vec{x}_1 \times \vec{x}_2 / |\vec{x}_1 \times \vec{x}_2|$

$-4(\cos(\pi/6)\cos(6) + \cos^2(6))\cos($

$\frac{-2\sqrt3}{2\sqrt3} + \frac{\sqrt3/2} {} = \frac{-3\sqrt3}{2}$

$\vec{n} = (\frac{-3\sqrt3}{2}, -5/2, 0)/|\vec{x}_1 \times \vec{x}$

Christo

Assessment of MTH499/MTH599/EAS621: Research in Scientific Computing Seminar: Mathematical and Computational Consulting and Professional Preparation Program Course.

Course Website:
http://www.math.umassd.edu/~aheryudono/mth499f2016site/index.html

The course also served as a service learning course that satisfies UMass Dartmouth University Studies Learning Through Engagement (5A) requirement.
There were 11 students participating in the course with 8 graduate students and 3 undergraduates.The students were from four different departments: Mathematics, Mechanical Engineering, Physics, and Biomedical Engineering. A faculty member from Mathematics Department ran the course with the help of two external guest lecturers: one physics professor affiliated with MIT and
one Python programmer from the local community. The clients, with whom students are working, are limited to local research groups at UMass Dartmouth.

Apart from meeting the deadlines in solving problems and report deliveries, the strong focus of the training is on oral, critical thinking, and written technical communication. On those aspects, there were constant feedback provided by faculty and students. Research progress talks and bi-weekly reports were uploaded to central project repositories which clients, students, and instructors can access. Students projects and course schedules were also posted in a dedicated course website. A major complaint of clients is that recent graduates do not have the reliability and conscientiousness that are necessary in the competitive workplace. Our main goal was also to train students in building a professional attitude in the handling of projects.

Research project discussion sessions consisting of students and clients from different background were a bit challenging in the beginning. Instructors observed that students really gave advices and collaborate with one another to help solving the projects. For example, at one particular discussion session, one of students had a problem in solving a system of nonlinear ordinary differential equations with MATLAB ode15s solver and the non-linear solver did not converge as expected. During the discussion, another student made a suggestion to the client to compute the Jacobian matrix exactly instead of using finite-difference approximation. As a result, the solver converges faster without any issues.

At the end of the course, feedback about the course was mostly positive: 4.34 out 5.00. Instructor felt that students met the objectives of the course. From the evaluation, most students felt that it was worth-while to take this course and having instructors and clients with different background (multidisciplinary) was very

interesting and educational. All students also wrote that their oral communication skills were definitely improved. Project reports were disseminated through technical reports, topics for graduate theses, and or submitted to publications with the clients. Instructors also invited external guess visitors from Naval Undersea Warfare Center, NVIDIA, and Promptus to share their experience in working in industry, a visitor from School of law to talk about patents, IP, and copyrights, and a visitor from College of Business to talk about management, harassment, and ethics in the workplace.

The outside lecturer commented that the scientific writing levels for the math students in the course still needs to be improved. Actually, his comment was to the effect that their level of writing is at the level of middle schoolers.

Overview of Assessment Plan for Department: timeline of outcome assessment and "closing the loop" and Overview of Assessment Goals for 2016-17

Fall 2016: Two in-person meetings on November 2 and December 7

In the Fall term, the Philosophy department assessment committee met twice to discuss how to improve our assessment. We discussed the challenges we have faced in attempting to gather meaningful and informative data, such as what did and did not work in our past assessment efforts. For example, previously we had one assessment measure for all levels of courses rather than tailoring specific assessment questions to specific courses. Consequently, our assessment measure was too long and did not seem to work for all levels of courses. We decided to refocus our efforts on assessing capstone work at the end of the Major rather than our previous practice of collecting data from every single course offered in each semester. We have agreed that we will begin collecting together capstone papers from our PHL 409 Seminar course offered every spring. This means that we will only be collecting assessment measures at the end of the spring semester rather than during both semesters. The aim is to gather capstone papers from each spring's PHL 409 Seminar course over multiple years so that we have papers collected from different instructors that can be randomized and anonymous.

Spring 2017: Two email meetings at the end of March and again in early May. One in-person end of year assessment meeting on May 23.

End of March: Finalized assessment plan and committee members
Committee members: Jennifer Mulnix, Tim Nulty, Maureen Eckert.

Re-affirmed assessment plan from Fall 2016: At the end of the year, members of the assessment committee will read capstone papers drawn from a randomized sample of papers that have been collected over the last three years from our PHL 409 Seminar course (2017, 2016, 2014; Spring 2015 papers from Prof. Cox are not available). Each committee member will read the capstone paper alongside an assessment rubric(s). There will be a minimum of two readers for each paper. We will then have a meeting during which we will discuss the students' competencies at achieving our program outcomes, including students' strengths and weaknesses. This will allow us to learn how to tailor future assessment plans. The Assessment Coordinator will then produce a report that will be distributed to the entire department for discussion at a department meeting in the Fall 2017.

Early May: Finalized rubrics to be used:
Because we refocused our attention on our Majors who have completed our capstone seminar, we decided to use new assessment rubrics. These rubrics will not focus on basic logic and domain-specific knowledge, but instead, focus on written communication and critical thinking skills, such analyzing information, evaluating information, and using that information to construct one's own original argument. More specifically, with respect to critical thinking, we are assessing the student's

ability to: explain issues; select and use information to investigate a conclusion; analyze others' assumptions and evaluate the relevance of contexts; consider other points of view; and evaluate implications and consequences of information. With respect to written communication, we are assessing the student's ability to: understand the audience and purpose of work; convey the writer's understanding of content; use appropriate sources and evidence; use proper syntax and mechanics.

As Assessment Coordinator, I collected papers from three different sections of PHL 409 Seminar. Upon collection of these papers, I discovered that over half of them were from Minors not Majors, and of those Majors, many of them were Juniors, not Seniors. I chose six papers, only from Majors, where four of those Majors were Seniors while two were Juniors. I removed the student names and sent them to the committee members for assessment. We will have three readers for each paper.

Upcoming - May 23: Assessment of capstone papers and discussion among assessment committee members. Members of the assessment committee will have read these capstone papers alongside the two assessment rubrics. During our meeting we will discuss the students' competencies at achieving our program outcomes, including students' strengths and weaknesses. This will allow us to learn how to tailor future assessment plans.

Identification and analysis of each assessment practice/tool implemented that includes:

Outcome assessed
PLO4. Demonstrate information literacy by determining the extent of information needed; accessing the needed information effectively and ethically; evaluating the information and its sources critically; and using the information to generate, develop or defend the student's own original arguments, either orally or in writing.

Tool used
AACU Critical Thinking VALUE Rubric (see Appendix I)
AACU Written Communication VALUE Rubric (see Appendix II)

Description of Evidence collected
We collected all capstone papers from our Philosophy Major Senior Capstone Course, PHL 409 Seminar over three different sections, 2017, 2016, and 2014. We then drew a randomized sample from those papers from Majors, with preference given to Seniors.

Interpretation of results
Will be included in Addendum

Proposed plan-of-action
Philosophy's aim is to find a baseline of where our students are as an information-gathering endeavor, which can contribute to an interesting department discussion about the nature and purpose of assessment, and importantly, a comparison for our future assessment efforts.

Plan for 2017-18
The Assessment Coordinator will produce a report that will be distributed to the entire department for discussion at a department meeting in the Fall 2017. At that point in time, an action plan for 2017-18 will be developed.

CRITICAL THINKING VALUE RUBRIC

for more information, please contact value@aacu.org

The VALUE rubrics were developed by teams of faculty experts representing colleges and universities across the United States through a process that examined many existing campus rubrics and related documents for each learning outcome and incorporated additional feedback from faculty. The rubrics articulate fundamental criteria for each learning outcome, with performance descriptors demonstrating progressively more sophisticated levels of attainment. The rubrics are intended for institutional-level use in evaluating and discussing student learning, not for grading. The core expectations articulated in all 15 of the VALUE rubrics can and should be translated into the language of individual campuses, disciplines, and even courses. The utility of the VALUE rubrics is to position learning at all undergraduate levels within a basic framework of expectations such that evidence of learning can by shared nationally through a common dialog and understanding of student success.

Definition

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

Framing Language

This rubric is designed to be transdisciplinary, reflecting the recognition that success in all disciplines requires habits of inquiry and analysis that share common attributes. Further, research suggests that successful critical thinkers from all disciplines increasingly need to be able to apply those habits in various and changing situations encountered in all walks of life.

This rubric is designed for use with many different types of assignments and the suggestions here are not an exhaustive list of possibilities. Critical thinking can be demonstrated in assignments that require students to complete analyses of text, data, or issues. Assignments that cut across presentation mode might be especially useful in some fields. If insight into the process components of critical thinking (e.g., how information sources were evaluated regardless of whether they were included in the product) is important, assignments focused on student reflection might be especially illuminating.

Glossary

The definitions that follow were developed to clarify terms and concepts used in this rubric only.

- Ambiguity: Information that may be interpreted in more than one way.
- Assumptions: Ideas, conditions, or beliefs (often implicit or unstated) that are "taken for granted or accepted as true without proof." (quoted from www.dictionary.reference.com/browse/assumptions)
- Context: The historical, ethical. political, cultural, environmental, or circumstantial settings or conditions that influence and complicate the consideration of any issues, ideas, artifacts, and events.
- Literal meaning: Interpretation of information exactly as stated. For example, "she was green with envy" would be interpreted to mean that her skin was green.
- Metaphor: Information that is (intended to be) interpreted in a non-literal way. For example, "she was green with envy" is intended to convey an intensity of emotion, not a skin color.

CRITICAL THINKING VALUE RUBRIC

for more information, please contact value@aacu.org

Definition

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

Evaluators are encouraged to assign a zero to any work sample or collection of work that does not meet benchmark (cell one) level performance.

	Capstone	Milestones		Benchmark
	4	3	2	1
Explanation of issues	Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

WRITTEN COMMUNICATION VALUE RUBRIC

for more information, please contact value@aacu.org

The VALUE rubrics were developed by teams of faculty experts representing colleges and universities across the United States through a process that examined many existing campus rubrics and related documents for each learning outcome and incorporated additional feedback from faculty. The rubrics articulate fundamental criteria for each learning outcome, with performance descriptors demonstrating progressively more sophisticated levels of attainment. The rubrics are intended for institutional-level use in evaluating and discussing student learning, not for grading. The core expectations articulated in all 15 of the VALUE rubrics can and should be translated into the language of individual campuses, disciplines, and even courses. The utility of the VALUE rubrics is to position learning at all undergraduate levels within a basic framework of expectations such that evidence of learning can by shared nationally through a common dialog and understanding of student success.

Definition

Written communication is the development and expression of ideas in writing. Written communication involves learning to work in many genres and styles. It can involve working with many different writing technologies, and mixing texts, data, and images. Written communication abilities develop through iterative experiences across the curriculum.

Framing Language

This writing rubric is designed for use in a wide variety of educational institutions. The most clear finding to emerge from decades of research on writing assessment is that the best writing assessments are locally determined and sensitive to local context and mission. Users of this rubric should, in the end, consider making adaptations and additions that clearly link the language of the rubric to individual campus contexts.

This rubric focuses assessment on how specific written work samples or collectios of work respond to specific contexts. The central question guiding the rubric is "How well does writing respond to the needs of audience(s) for the work?" In focusing on this question the rubric does not attend to other aspects of writing that are equally important: issues of writing process, writing strategies, writers' fluency with different modes of textual production or publication, or writer's growing engagement with writing and disciplinarity through the process of writing.

Evaluators using this rubric must have information about the assignments or purposes for writing guiding writers' work. Also recommended is including reflective work samples of collections of work that address such questions as: What decisions did the writer make about audience, purpose, and genre as s/he compiled the work in the portfolio? How are those choices evident in the writing -- in the content, organization and structure, reasoning, evidence, mechanical and surface conventions, and citational systems used in the writing? This will enable evaluators to have a clear sense of how writers understand the assignments and take it into consideration as they evaluate

The first section of this rubric addresses the context and purpose for writing. A work sample or collections of work can convey the context and purpose for the writing tasks it showcases by including the writing assignments associated with work samples. But writers may also convey the context and purpose for their writing within the texts. It is important for faculty and institutions to include directions for students about how they should represent their writing contexts and purposes.

Faculty interested in the research on writing assessment that has guided our work here can consult the National Council of Teachers of English/Council of Writing Program Administrators' White Paper on Writing Assessment (2008; www.wpacouncil.org/whitepaper) and the Conference on College Composition and Communication's Writing Assessment: A Position Statement (2008; www.ncte.org/cccc/resources/positions/123784.htm)

Glossary
The definitions that follow were developed to clarify terms and concepts used in this rubric only.

- Content Development: The ways in which the text explores and represents its topic in relation to its audience and purpose.
- Context of and purpose for writing: The context of writing is the situation surrounding a text: who is reading it? who is writing it? Under what circumstances will the text be shared or circulated? What social or political factors might affect how the text is composed or interpreted? The purpose for writing is the writer's intended effect on an audience. Writers might want to persuade or inform; they might want to report or summarize information; they might want to work through complexity or confusion; they might want to argue with other writers, or connect with other writers; they might want to convey urgency or amuse; they might write for themselves or for an assignment or to remember.
- Disciplinary conventions: Formal and informal rules that constitute what is seen generally as appropriate within different academic fields, e.g. introductory strategies, use of passive voice or first person point of view, expectations for thesis or hypothesis, expectations for kinds of evidence and support that are appropriate to the task at hand, use of primary and secondary sources to provide evidence and support arguments and to document critical perspectives on the topic. Writers will incorporate sources according to disciplinary and genre conventions, according to the writer's purpose for the text. Through increasingly sophisticated use of sources, writers develop an ability to differentiate between their own ideas and the ideas of others, credit and build upon work already accomplished in the field or issue they are addressing, and provide meaningful examples to readers.
- Evidence: Source material that is used to extend, in purposeful ways, writers' ideas in a text.
- Genre conventions: Formal and informal rules for particular kinds of texts and/or media that guide formatting, organization, and stylistic choices, e.g. lab reports, academic papers, poetry, webpages, or personal essays.
- Sources: Texts (written, oral, behavioral, visual, or other) that writers draw on as they work for a variety of purposes -- to extend, argue with, develop, define, or shape their ideas, for example.

WRITTEN COMMUNICATION VALUE RUBRIC

for more information, please contact value@aacu.org

Definition

Written communication is the development and expression of ideas in writing. Written communication involves learning to work in many genres and styles. It can involve working with many different writing technologies, and mixing texts, data, and images. Written communication abilities develop through iterative experiences across the curriculum.

Evaluators are encouraged to assign a zero to any work sample or collection of work that does not meet benchmark (cell one) level performance.

	Capstone 4	Milestones 3	2	Benchmark 1
Context of and Purpose for Writing *Includes considerations of audience, purpose, and the circumstances surrounding the writing task(s).*	Demonstrates a thorough understanding of context, audience, and purpose that is responsive to the assigned task(s) and focuses all elements of the work.	Demonstrates adequate consideration of context, audience, and purpose and a clear focus on the assigned task(s) (e.g., the task aligns with audience, purpose, and context).	Demonstrates awareness of context, audience, purpose, and to the assigned tasks(s) (e.g., begins to show awareness of audience's perceptions and assumptions).	Demonstrates minimal attention to context, audience, purpose, and to the assigned tasks(s) (e.g., expectation of instructor or self as audience).
Content Development	Uses appropriate, relevant, and compelling content to illustrate mastery of the subject, conveying the writer's understanding, and shaping the whole work.	Uses appropriate, relevant, and compelling content to explore ideas within the context of the discipline and shape the whole work.	Uses appropriate and relevant content to develop and explore ideas through most of the work.	Uses appropriate and relevant content to develop simple ideas in some parts of the work.
Genre and Disciplinary Conventions *Formal and informal rules inherent in the expectations for writing in particular forms and/or academic fields (please see glossary).*	Demonstrates detailed attention to and successful execution of a wide range of conventions particular to a specific discipline and/or writing task (s) including organization, content, presentation, formatting, and stylistic choices	Demonstrates consistent use of important conventions particular to a specific discipline and/or writing task(s), including organization, content, presentation, and stylistic choices	Follows expectations appropriate to a specific discipline and/or writing task(s) for basic organization, content, and presentation	Attempts to use a consistent system for basic organization and presentation.
Sources and Evidence	Demonstrates skillful use of high-quality, credible, relevant sources to develop ideas that are appropriate for the discipline and genre of the writing	Demonstrates consistent use of credible, relevant sources to support ideas that are situated within the discipline and genre of the writing.	Demonstrates an attempt to use credible and/or relevant sources to support ideas that are appropriate for the discipline and genre of the writing.	Demonstrates an attempt to use sources to support ideas in the writing.
Control of Syntax and Mechanics	Uses graceful language that skillfully communicates meaning to readers with clarity and fluency, and is virtually error-free.	Uses straightforward language that generally conveys meaning to readers. The language in the portfolio has few errors.	Uses language that generally conveys meaning to readers with clarity, although writing may include some errors.	Uses language that sometimes impedes meaning because of errors in usage.

TO:	Jen Riley and Sarah Cosgrove
FROM:	Doug Roscoe
DATE:	May 20, 2017
RE:	Final Assessment Report for 2016-2017

Our major project for this year was an assessment of our capstone research papers. Our approach was to have a full-department, qualitative evaluation of a selected set of papers. Rather than assessing papers with quantitative scores, we decided to use our reading of the papers as an opportunity to have a conversation about what our students do well and what could be improved (and how we might change curriculum and instruction to help them).

Below you will find the report from our meeting, which took place on March 24, 2017. The report describes the process and provides summary minutes from the discussion.

The meeting was highly productive, and a number of action items were generated, which we are continuing to discuss and move forward.

- There was agreement that a *growth-model* approach to student writing was necessary, and accurate assessment would require looking at students' work over time. Many students fall short of complete mastery at the capstone level, but we suspect many have made tremendous progress in their writing since they matriculated. To address this, we have created an archive in a shared drive in which we will place all student papers going forward. After several years, we should be able to extract the work of individual students at various points in their academic career.
- We had a good discussion of what we really expect as a capstone level of competence. We agreed that it wasn't reasonable to expect students to pull off a true social science research paper, which is really a graduate level competency. The trouble is that they have only begun the study of statistical research methods. There was a sense that what we really want is for students to attempt to answer an empirical research question using some kind of evidence. Even political theory papers, which may involve more normative than empirical issues, require the defense of a position using evidence. So we decided we should be focusing on the concept of argumentation (original social science analysis being only one kind of evidence students might use to support their arguments). There was discussion of altering

our learning outcomes to aim more directly at this outcome, and plans were made to discuss it further.

- We talked about course sequencing, and how we could align some of the required courses to reinforce or scaffold student writing skills. One problem we identified is that students may be taking the capstone earlier than they should. Right now, our capstone (498) is a separate section that is combined with a regular section of a seminar (400-level courses). Students can enroll in either the regular seminar section or 498, and it doesn't really matter because the enrollments are all combined into one course. Students can take seminars at any point, as long as they have met any pre-reqs, so many juniors and even a few sophomores take the capstone. We decided that, while students can certainly take one of their two required seminars early on, their capstone should happen senior year. Consequently, we are planning to institute a 90-credit-earned requirement to enroll in 498.

- The other sequencing opportunity we observed was within our intermediate writing (249) and research methods (349) courses. We have already done some curricular alignment between them, but we discussed standardizing some of the language and concepts we use to talk about arguments and argumentation. Additionally, we have always expected some degree of writing instruction in our required introduction to political theory (171), and we agreed the alignment should include this course since it focuses on argumentative writing. Because students can take these three courses in any chronological order, it's not really possible to scaffold student learning, but we can align and reinforce the concepts taught. Next year a group of 171, 249 and 349 instructors will meet to discuss how to do this.

Department of Political Science

Report – Assessment Meeting to Discuss Capstone Papers

On March 24, 2017, the members of the Political Science Department met for two hours to discuss a set of capstone papers that had been collected over the last several semesters. All full-time faculty (including an FTL) participated, as well as a benefitted PTL; there were ten faculty members in total. There were thirteen papers included, and each member of the faculty read four papers. Consequently, each paper was read by at least three people. Faculty were given a form to use while reading their assigned papers that focused on the full set of program learning outcomes, but it was made clear that the purpose of the assessment was to guide a qualitative discussion, not to produce quantitative scores for each paper.

At the meeting, the group began by discussing each paper in turn, noting strengths and weaknesses. After that, the group discussed each learning outcome in order, focusing on how well the papers overall appeared to meet each outcome. This report provides a record of these discussions. Though our discussion was always structured by the paper or outcome under examination, we often digressed into broader conversations about students, pedagogy, and curriculum. Indeed, these digressions were the intended goal of the assessment. In order to provide a useful record, the report is organized into columns. The first column lists the paper or outcome being discussed, the second column our observations directly related to the paper/outcome, and the third column any broader points that were raised or discussed.

Paper Analysis

Paper 1	weak on synthesis and organization; reads too much like an annotated bibliography, not a paper	capstone papers can't show us growth and improvement; need early work from students to compare; might be good to match 249 and 349 student papers
Paper 2	strong paper overall	
Paper 3	lack of direction; weak organization; needed headings; hard to see the main thesis; problems with citing properly	
Paper 4	no underlying research question; no relevant literature review; missing half of what should be there	
Paper 5	also missing half (may have been the nature of this particular assignment); documentation problems	
Paper 6	excellent writing; strong overall;	many students struggle to distinguish the *sections* of long-form papers; what are reasonable expectations for our best

		undergraduate capstone papers? should it be enough that a student makes a solid attempt at an empirical argument, even if that argument would not be sophisticated enough for, or convincing to, a scholarly audience? it is probably not reasonable to expect professional or even post-graduate level analysis
Paper 7	the writing was verbose; the analytical approach was sound, and the research was good; there was a good attempt at using data	
Paper 8	there were some flaws and issues; good case study design; serious writing and organizational problems	
Paper 9	good research question and nice use of data; but there was a failure at outcome 1B, interpretation of data	
Paper 10	hypothesis-driven; needed to employ conceptual definitions; the tone of the writing was off	many students struggle with tone; some instructors find it useful to emphasize the importance of *audience* in guiding students' papers and getting their tone to be correct
Paper 11	more of a position paper than a research paper; not a lot of empirical evidence	what exactly are we looking for in a capstone paper? does it have to be a traditional empirical research paper? or just an argumentative paper? should we consider making 349 a pre-req for 498? or maybe we set a 90 credit hour minimum for enrolling in 498, in order to make it a true capstone (sequentially speaking)
Paper 12	doesn't cut it as an undergrad capstone paper; appears to have been quickly turned out	
Paper 13	weak overall; writing issues; weak conceptual definition; good effort, and lots of material; but needed focus, didn't drive toward a thesis	

Learning Outcome Analysis

Outcome 1A	papers were pretty solid on this outcome; most dug into the literature pretty well and wrestled with real political science questions	
Outcome 1B	this is probably our students' weakest outcome; really we want our students to be able to pose a research question and then choose the proper method to answer it, but students struggle with even basic social science methods	should we consider re-writing this outcome to aim more directly at what we want? we really want students to know how to marshal empirical evidence to answer a question; we discussed political theory papers and how they differ from other capstone papers; is there a broader intellectual skill we are looking for that captures both kinds of argumentation? an alternative outcome was proposed: "form political science research questions and utilize research skills to answer effectively using appropriate evidence"; we will revisit this possibility at a later meeting
Outcome 1C	students struggle with synthesis; they do access and understand well; 349 is preparing them effectively for finding the right kinds of literature	
Outcome 2A	we often see opinions, not arguments; often they can formulate arguments fine, but they struggle with analyzing them	
Outcome 2B	critical thinking skills are not highly developed	discussed the possibility of scaffolding instruction about argumentation between 171 and 249; common concepts/jargon, so it's reinforced and their skills build in a 171-249-349 sequence (though it's more reinforcement than scaffolding, since 171 is not a pre-req for 249)
Outcome 3A		here is where we really need to use a growth model to assess our effectiveness; some capstone students may not be expert writers, but they may have improved considerably; we will initiate a process to collect all students papers from all courses at all levels; after several years, we can pull sequences of papers to assess growth
Outcome 3B	students struggle with transitions	there may be some limits to what we can do to improve writing skills—there may be some inherent limitations for many of our students; there should be an emphasis on more low stakes, frequent

		writing; agreement that more papers will be better for improving student writing

PSC Major – Learning Outcomes

We aim to prepare graduates who are informed, critical, and articulate concerning public affairs.

By "informed," we mean graduates who:

    1A - understand concepts, theories and empirical findings in political science;
    1B - possess basic research skills including research design, data analysis and interpretation; and
    1C - can access, understand and synthesize professional and popular writing on public affairs.

By "critical," we mean graduates who:

    2A - are able to formulate and analyze arguments including their structure and force; and
    2B - assess the relevance and weight of evidence;

By "articulate," we mean graduates who:

    3A - are able to write clearly and persuasively; and
    3B - are capable of organizing their ideas in a focused paper or presentation.

Psychology Department Undergraduate Assessment Report for AY 2016-2017
Prepared by Trina Kershaw and Judy Sims-Knight, Assessment Coordinators, with review from the Psychology Department Assessment Committee: Brian Ayotte, Aminda O'Hare, Elizabeth Richardson, Robin Locke-Arkerson, Chris Cipriano, and Ted Powers, and with contributions from Meredith Dove

Overview of Assessment Plan for Department
As mentioned in the 2015-2016 AY report, the Psychology Department has been working to map our curriculum to the most recent learning goals published by the APA (American Psychological Association).

The APA goals include 5 major classes of goals, each with sub-goals that have indicators of student learning both at a foundational level (after the first 4 courses) and at a baccalaureate level.

The 5 major classes of goals are:
1. *Knowledge Base in Psychology*
2. *Scientific Inquiry and Critical Thinking*
3. *Ethical and Social Responsibility in a Diverse World*
4. *Communication*
5. *Professional Development*

Across these 5 major classes of goals, there are 95 foundation indicators of learning, and 95 baccalaureate indicators of learning. We believe it is impossible to assess every indicator of learning within the APA guidelines. Thus, this year the Assessment Committee began to think about which of these learning indicators are already present in our assessments. We also began to adapt existing department measurements as assessments within this APA learning indicator framework. Along with this report, we have included a draft framework of how our courses map to the APA's learning goals. Our framework includes when content and skills to meet a learning goal are introduced, when content and skills are reinforced, and when we believe they are mastered.

Overview of Assessment Goals for AY 2016-2017
1. Simulation project.
The objectives of this project are to (a) assess students' abilities to think like psychologists, (b) make this assessment effective and efficient, and (c) use the results of the assessment to meaningfully improve our students' learning. The assessment instrument was developed during AY 2014-2015 and we collected data that year, but the sample sizes were too small. In AY 2015-2016 we had trouble with the implementation and collected no data. This year, Judy Sims-Knight recreated the four simulation versions in Qualtrics and data were collected during Fall 2016 and Spring 2017, as they had been in the first year.

2. Assessment of research article comprehension in PSY 308.
Part of Trina Kershaw's ongoing research involves tracking two elements of students' research skills: learning how to read empirical journal articles and learning how to connect data and theory. Data collected over several semesters have shown that students in her PSY 308 sections

improve in their research article comprehension skills, as compared to control groups. Pre- and post-test data were collected during Fall 2016 and Spring 2017.

3. Assessment of students' ability to connect data and theory in PSY 308.
Part of Trina Kershaw's ongoing research involves tracking two elements of students' research skills: learning how to read empirical journal articles and learning how to connect data and theory. Over the summer of 2016, Trina and Judy developed a coding scheme for students' open-ended answers for these data and coded a portion of the data. A description of this coding scheme follows below. An assessment was used in all sections of PSY 308 this year, but these assessments have not been analyzed yet. Also, metacognitive and control prompts (the same as in Spring 2016) for the data-theory assignments were used in Trina's PSY 308 courses this year.

4. Assessment of APA learning indicators via supervisor ratings of practicum students (PSY 407 and PSY 480).
Supervisors of students in clinical practicums are asked to fill out a standard evaluation form. Trina Kershaw worked with Ted Powers to compare the items on the evaluation form to APA learning indicators that address topics such as ethical behavior and professional development. We also had input from Meredith Dove, who teaches these courses. Several items were revised and an item was added about the level of clinical skill the student showed. This revised form was used for the PSY 407 course this Fall and the PSY 480 (internship) course in the Spring.

5. Use and refinement of methodology-oriented questions to trace knowledge growth from statistics to research methods.
The common final exam questions for PSY 205 Statistics for Psychology were developed last year and were given as part of a post-test measure in the research methods lab sections. Although we had a plan to revise questions in the Spring 2017 semester, the Psychology Department has recently begun a Statistics Collaborative for the statistics instructors. This task will best be accomplished by this committee, which will begin work this summer. Our department also has a Research Methods Collaborative that has been instrumental in coordinating common instruction and assessments across the methods courses, and we expect similar positive outcomes from the Stats Collaborative.

Identification and Analysis of Assessment Tools in Relation to Assessment Goals
This aspect of the report will focus on the assessment tools that we used this year in relation to each of the assessment goals that are summarized above. As each tool is discussed, it will be in reference to the APA learning indicators that are being assessed within it.

1. *Simulation project.*
Outcomes assessed: This assessment addresses two APA learning indicators under Goal 2, *Scientific Inquiry and Critical Thinking*. The two relevant indicators are:
* Use quantitative and/or qualitative analyses to argue for or against a particular hypothesis
* Apply knowledge of research skills necessary to be an informed consumer of research or critic regarding unsupported claims about behavior

<u>Tools used</u>: We had previously developed simulation assessments in which a virtual group tries to decide whether a particular product (e.g., a set of videos to make babies smart) is valid. The simulation is designed to assess students' knowledge of (a) how to find valid information, (b) how to evaluate specific studies, and (c) how to use the results to make a decision. Four different versions were made that followed the same structure, but each had a different cover story. For example, one cover story suggests that your grandmother has been having some memory issues, and that your family has enlisted the help of you and your cousins to research treatments.

<u>Description of evidence collected</u>: We now have two years of assessments of students at the beginning of PSY 205 (a majors-only statistics course that is typically taken during the sophomore year) and at the end of senior courses (primarily depth/capstone courses) and have sufficient number of students to complete statistical analyses.

<u>Proposed plan-of-action</u>:

1. The primary objective is to ascertain whether our students improve in their ability to evaluate research by comparing students who are relatively early in the major (at the beginning of the sophomore class PSY 205) to those who have completed most of the major (at the end of a senior course). Through these analyses, we will discover whether seniors are more proficient in scientific reading than sophomores. If not, the simulation allows us to identify areas where they are relatively proficient vs. areas where they are not. This will be done both by statistically analyzing the quantitative portion of the assessment and qualitatively analyzing the open-ended questions. Judy will conduct the quantitative analyses; Elizabeth Richardson and Chris Cipriano will conduct the qualitative analyses.

2. A secondary objective is to analyze the effectiveness of the simulation itself. We have four versions, two in which the hypothesis is supported and two in which it is not. Judy will find out whether there are differences among these simulations, both by summary scores and by individual questions.

When the analyses are completed, the committee will review them and develop plans for curricular improvement, which we will present to the department as a whole.

2. *Assessment of research article comprehension in PSY 308.*
<u>Outcomes assessed</u>: This assessment addresses several of the APA learning indicators that are part of second major class of the learning goals, *Scientific Inquiry and Critical Thinking*. Specifically, the assessment measures students' ability to:
- Accurately identify key research concepts (hypothesis, operational definition, etc.) in existing and proposed research projects
- Interpret complex statistical findings and graphs in the context of their level of statistical significance, including the influence of effect size, and explain these findings using common language
  - This learning indicator is similar to one from the fourth major class of learning goals, *Communication*: Interpret quantitative data displayed in statistics, graphs, and tables, including statistical symbols in research reports

- Read and summarize complex ideas accurately, including future directions, from psychological sources and research

<u>Tool used</u>: Learning to read journal articles was assessed using a multiple-choice pre-test/post-test design. The questions students answer focused on the main components of a research article: the purpose, participants and procedure, independent variables, dependent variables, results, conclusion, and criticisms. Students read a research article and answered the questions. They also wrote an open-ended summary in which they described the main points of the article, provided critiques, and explained real-world implications. To accurately answer these questions and write the summary, students must first be able to identify key research concepts, including the hypothesis, independent, and dependent variables. Second, they must be able to interpret statistical findings and put them in common language. Third, they must be able to understand complex concepts within research articles, such as the broader implications of the research.

<u>Description of evidence collected</u>: Data were collected using the multiple-choice research article assessment and summary task during Fall 2016 and Spring 2017. During the Fall, data were collected in two sections of PSY 308: one taught by Trina Kershaw and the second taught by Aminda O'Hare. Aminda also used empirical journal articles to teach students but chose different articles. Both instructors used similar assignments to scaffold learning to read empirical research articles. These assignments featured five standard questions that focused on the purpose, methodology, results, and conclusions of each research article, as well as a question that asked students for their critiques of the research. The Fall 2016 sections differed, however, in the last article-specific question they used for each assignment. Trina focused on real-world applications for the articles, while Aminda focused on connections between the articles and theoretical concepts that were covered in class.

During the Spring, data were collected in two sections of PSY 308 that were both taught by Trina Kershaw. One section followed her standard teaching of articles, and completed the usual number of assignments, while the other section completed fewer of these research article assignments and instead wrote personal responses to some of the articles. Thus, both Spring 2017 sections read the same research articles but they approached some of them in different ways.

<u>Interpretation of results</u>: Data from this academic year will be analyzed this summer, but data from the previous academic year are currently in a manuscript that is under review in *Instructional Science*. The manuscript was submitted in November, received a revise and resubmit, and was resubmitted in April. The manuscript is included as an attachment with this report. Data from 2015-2016 are covered in Experiment 2. In brief, students who learned to read research articles (Trina Kershaw's PSY 308 classes) showed improvement both on the multiple-choice assessment, and on a task that required the writing of a summary. In contrast, students from a control section of PSY 308, who did not learn how to read research articles, did not show improvement on either assessment.

<u>Proposed plan-of-action</u>: As mentioned above, the data that were collected during the 2016-2017 AY will be analyzed this summer. Not only will the multiple-choice assessment be scored, but we will look at the summary task as well. In the past, including in the data that are in our manuscript, the only portion of the summary task that has been coded are students' summaries of

the main points of the article. This summer, we will develop a coding scheme for the portions of the summaries in which students discuss the real-world implications of the article. Coding these summaries and analyzing these data will give us a broader picture of what students are learning in PSY 308, especially depending on how much the applications of psychological research are emphasized in class.

3. *Assessment of students' ability to connect data and theory in PSY 308.*
<u>Outcomes assessed</u>: This assessment addresses an APA learning indicator that is part of the fourth major class of the learning goals, *Communication*.
- Construct arguments clearly and concisely using evidence-based psychological concepts and theories

<u>Tool used</u>: Students completed a pre-/post-test assessment, as well as a series of four assignments, in which they needed to make connections between data and theory. Specifically, they were presented with two competing theories. They then read descriptions of two research studies, and had to evaluate each study in light of each theory – did the study support the theory, refute it, or both? This evaluation was a multiple-choice question with the options of strongly supports, somewhat supports, neither/mixed (supports and refutes equally), somewhat refutes, and strongly refutes. Students also had to justify their evaluation through an open-ended response. This justification required them to construct clear and concise arguments that were supported by evidence from the research studies. Parts of the text of the pre-/post-test assessment tool are provided in Appendix A.

<u>Description of evidence collected</u>: The pre-/post-test assessment was used in all sections of PSY 308 during the 2016-2017 AY. The data-theory assignments were only used in Trina Kershaw's PSY 308 sections (3 of 4 sections taught this year).

<u>Interpretation of results</u>: Because the assessment uses both multiple-choice and open-ended questions, the data require different modes of analysis. As mentioned in the 2015-2016 Assessment Report, analysis of the multiple-choice questions showed no significant improvements from pre-test to post-test on the study theory questions, no group differences, and no interaction, all Fs < 1.05. The groups for these analyses were the Spring 2016 prompt groups, the Fall 2015 control class, classes from Spring 2015 (did data-theory assignments but did not have prompts), and classes from Spring 2013 (did not do data-theory assignments). It is not especially surprising to find no differences on questions that students can be correct on just by guessing.

Thus, it is necessary to analyze students' answers on the open-ended questions to understand how they construct arguments to evaluate research data in relation to psychological theories. To assess students' ability to connect data and theory, Judy Sims-Knight and Trina Kershaw developed a coding scheme for the open-ended questions. This coding scheme focused on how well students understood the results of the target study, how well they understood the target theory, and how well they made an accurate connection between the data and the theory. The coding scheme is included as an attachment to this report.

Development of this coding scheme took approximately 30 hours to complete. Most of the work was done over Summer 2016. We have spent some time during Fall 2016 and Spring 2017 on continuing to code data, but at this time have only gotten through the open-ended responses from the Spring 2016 courses (56 students/224 responses).

During the Spring 2016 semester, students were randomly divided into two groups for their data-theory assignments. Before each question on a given data-theory assignment, students either answered a metacognitive reflection question (ex. What do you know that will help you answer the next question?) or a control question (ex. What is the next question asking?). In the analyses below, students are labeled as being from the metacognitive or control prompt group.

	Pre	Post	n
Group			
Metacognitive Prompt	3.15 (1.90)	3.61 (2.15)	27
Control Prompt	3.55 (1.81)	3.93 (2.02)	29

Note: Values are displayed as M (SD). The max score was 8.

A factorial analysis of variance (ANOVA) was conducted with pre-test vs. post-test as the within-subjects variable and group, metacognitive vs. control prompt, as the between-subjects variable. The main effect of pre- vs. post-test was not significant, $F(1, 54) = 2.55$, $p = .12$, but it was in the expected direction, with post-test scores higher than pre-test scores. There was no main effect of group and no interaction, Fs < 1. So, while there was no difference between the prompt groups, the students' scores did improve, although not significantly, between the pre-test and the post-test.

Proposed plan-of-action: Our biggest goal is to code the remaining data, which is approximately 1000 responses. We will work on this over Summer 2017. It is important to know if the data-theory assignment actually helps students to evaluate data in relation to theories. Not only is this important for assessment, but each data-theory assignment takes approximately 10 hours to grade. If no difference is seen on the open-ended questions between the different datasets, then we will know that this is not an effective way to teach this skill and a different approach will be needed.

4. *Assessment of APA learning indicators via supervisor ratings of practicum students (PSY 407 and PSY 480).*
Outcomes assessed: Trina Kershaw and Ted Powers worked with an instructor of our undergraduate practicum and internship courses, Meredith Dove, to revise the supervisor evaluation form that are filled out for each student intern. Our revisions involved mapping the evaluation form to several APA learning indicators. The evaluation form addresses components of learning goals 3, *Ethical and Social Responsibility in a Diverse World*, 4, *Communication*, and 5, *Professional Development*. The learning indicators are marked within the form in Appendix B.

<u>Tool used</u>: As mentioned above, the supervisor evaluation form was used, and the full form is in Appendix B. Supervisors rated students on a scale of 1 = not at all to 6 = always.

<u>Description of evidence collected</u>: The evaluation forms were sent to supervisors in Fall 2016 for the undergraduate practicum class (PSY 407) and in Spring 2017 for the undergraduate internship class (PSY 480). At the time of the writing of this report, 17 forms were available from the PSY 407 class, and 13 forms were available from the PSY 480 class.

<u>Interpretation of results</u>: The first 3 items on the evaluation form were used to assess evidence of students developing skill sets that are desired by psychology-related employers. For PSY 407, the mean rating was 5.84 out of 6. For PSY 480, the mean rating was 5.81.

Items 4, 5, 8, and 9 were used to assess two learning indicators: that students interact effectively with others, and that students exhibit high standards of positive personal values in interpersonal and work-related relationships. For PSY 407, the mean rating was 5.88 out of 6. For PSY 480, the mean rating was 5.85 out of 6.

Items 10 and 11 were used to assess students' appropriate pursuit of and response to feedback from educators, mentors, supervisors, and experts to improve performance. For PSY 407, the mean rating was 5.65 out of 6. For PSY 480, the mean rating was 5.67.

As can be seen from the ratings obtained, there was not much variation within supervisors' ratings of the student interns. In general, supervisors were very pleased with the performance of the interns on the target learning indicators. Of the larger sample above, evaluations of 10 students were available for both PSY 407 and PSY 480. Paired-samples t-tests for each learning indicator showed no significant difference in evaluations between the two semesters, all ts < 1.

<u>Proposed plan-of-action</u>: The first step will be to perform the analyses again with the remaining students from the 2016-2017 AY. The forms were unfortunately only available from one of the instructors at the time of this report's writing. The second step will be to discuss the full results with the PSY 407 and PSY 480 instructors to determine if the evaluation form is capturing students' learning in the targeted areas. Based on this discussion, the evaluation form may be revised, or perhaps we will collect another year's worth of data before making any changes. Even with the remaining students added from this year, the entire sample will be no more than 40 students.

Plan for AY 2017-2018
During the 2017-2018 AY, we should be ready to close the loop using one or more of the three assessments of APA Goal 2: (a) the simulation assessment, (b) comprehension of research articles, and (3) connecting data to theory. The Assessment Committee will review the learning outcome data and decide on what to recommend to the Psychology Department. Our work on how best to assess clinical skills in students will focus on better assessment.

Appendix A

Selected Parts of Learning to Connect Data and Theory Assessment with Scoring
Developed by Jordan Lippman (collaborator with Trina Kershaw)

Please read about this controversy in psychological research and theory.
Children have naïve or intuitive ideas about the physical world and how it works. For example, children as young as three months understand that an object will fall if it is not supported by another object (e.g., a cup on a high chair). These knowledge structures are derived from experience and prior to instruction on a topic, children base their explanations of the physical world on them. But there are contrasting theories about the structure of this knowledge.

The coherent framework theorists argue that children's intuitive ideas about the world are organized and work together to help children provide consistent explanations of the world in many different situations. Knowledge--in--pieces theorists hold that children have isolated but stable experience--based notions of parts of the world, even about the same scientific concept (e.g., speed or force). They may have many independent and seemingly contradictory but intuitively sensible ideas. These theories do not attempt to explain the effect of instruction and feedback on the structure of children's knowledge. Rather, both theories focus on the intuitive knowledge of the world that children and adolescents acquire prior to any formal instruction on a given scientific topic.

Each of these theories has many supporters who think their preferred theory is correct. Yet, because these theories provide different explanations of the same aspect of mental life, and make different predictions it appears only one of them can be correct.

Next, you will read about two theories that have been proposed to explain this phenomenon.

Coherent Theory Description	Knowledge--in--pieces (KIP) Theory Description
Children's intuitive ideas about the physical world (e.g., about falling objects) are organized, coherent, and internally consistent. Ideas derived from different experiences related to the same topic (e.g., toys that are dropped or tossed) are automatically fused into cohesive mental frameworks or structures (e.g., about all falling toys or objects). Assumptions such as "physical objects are solid," or "unsupported objects fall" may underlie their network of ideas about all physical objects. Like scientific theories but less precise and systematic, these frameworks facilitate consistent thought about a topic independent of the situation and context (different toys dropped in different locations).	Children's intuitive ideas about the physical world (e.g., about falling objects) are fragmented and composed of many different and possibly contradictory explanatory elements. Ideas derived from an experience (e.g., a falling toy) remain isolated from knowledge that adults would consider similar (e.g., a different toy falling in the same location or the same toy falling somewhere else). Each idea element is mentally associated with experiences relevant to it. Rather than being organized by topic, ideas are stored based on their context (e.g., a toy falling down the stairs vs. off the table). Ideas are context--bound, so different ideas (i.e., the blue block falling) will be used depending on

These mental frameworks are relatively coherent and result in the same ideas being used whenever a child thinks about a given topic.	the situation (e.g., off the chair when inside vs. outside).

The description of the method and results of the "Force" Study are shown below. Use these to answer the questions.

Description of the Method for the "Force" Study
Researchers interviewed 100 children between 4 and 15 years old about their understanding of force, using 27 drawings of physical objects of different sizes and states of motion. Participants stated whether a force was acting on an object, or compared forces acting in different situations (e.g., objects of the same size in different states of motion). Researchers (blind to student identity) categorized all responses by question into 1 of 7 meanings of force including internal force, acquired force, force of push, force of gravity, and a few other combinations of these. The researchers analyzed the content and properties of students' responses to the interview questions, looking for patterns in the meanings of force across the interview questions.

Description of the Results of the "Force" Study
When assessed prior to taking a class on the subject, almost 90% of the participants consistently used exactly one of these meanings of force on all 27 questions. For example, one participant said only "force of push" was acting on a ball thrown by a pitcher both when the ball was released from the pitcher's hand and in a different question also said "force of push" was acting on a ball as it fell to the ground from a shelf. Participants' explanations of the various objects contained a high proportion of action words (i.e., verbs like flew, bounce, and threw) and responses provided by some participants were longer than were responses by other participants.

What type of relationship do the results of this study have to the Coherent Theory?
Strongly supports (very consistent with the theory) **1**
Somewhat supports (mostly consistent with the theory) **1**
Neither/mixed (supports and refutes the theory equally) **.5**
Somewhat refutes (mostly inconsistent with the theory) **0**
Strongly refutes (very inconsistent with the theory) **0**

What type of relationship do the results of this study have to the KIP Theory?
Strongly supports (very consistent with the theory) **0**
Somewhat supports (mostly consistent with the theory) **0**
Neither/mixed (supports and refutes the theory equally) **.5**
Somewhat refutes (mostly inconsistent with the theory) **1**
Strongly refutes (very inconsistent with the theory) **1**

The description of the method and results of the "Thermodynamics" Study are shown below. Use these to answer the questions.

Description of the Method for the "Thermodynamics" Study
Researchers conducting a four--year longitudinal study interviewed fifty students 5 different times during eighth grade, and then again before tenth and twelfth grade. Identical interview questions administered at each time point addressed students' understanding of 5 different thermodynamics concepts (e.g., heat flow, insulation, and conduction) covered in 10th grade. Researchers (blind to student identity) categorized responses as one of four distinct types: non--standard, transitional, standard, or sophisticated. The researchers analyzed the content and properties of students' explanations, looking for patterns in the types of ideas used both within an interview and across the 5 interviews.

Description of the Results of the "Thermodynamics" Study
In 8th grade, ninety--six percent of the students conveyed many (at least 5) distinct and contradictory ideas about a single topic (e.g., heat conduction), both across interviews and even within a single interview. For example, one student stated that, "wood and metal objects in a hot trunk probably would be the same temperature" but later in the same interview he said, "metal objects would be hotter than wood if placed in a hot oven." Explanations of the concept of insulation had the same number of words but significantly more syllables per word when compared to explanations of the other four thermodynamics concepts.

What type of relationship do the results of this study have to the Coherent Theory?
Strongly supports (very consistent with the theory) **0**
Somewhat supports (mostly consistent with the theory) **0**
Neither/mixed (supports and refutes the theory equally) **.5**
Somewhat refutes (mostly inconsistent with the theory) **1**
Strongly refutes (very inconsistent with the theory) **1**

What type of relationship do the results of this study have to the KIP Theory?
Strongly supports (very consistent with the theory) **1**
Somewhat supports (mostly consistent with the theory) **1**
Neither/mixed (supports and refutes the theory equally) **.5**
Somewhat refutes (mostly inconsistent with the theory) **0**
Strongly refutes (very inconsistent with the theory) **0**

Appendix B

Undergraduate Practicum Student Evaluation Form

Psychology 407/Psychology 480

Name of Intern: _____

1 = not at all   2 = slightly   3 = sometimes   4 = often   5 = very often   6 = always   N/A

> **5.5**: Develop evidence of attaining skill sets desired by psychology-related employers

> **3.2**: Exhibit high standards of positive personal values in interpersonal and work-related relationships

> **4.3**: Interact effectively with others

> **5.2**: Pursue and respond appropriately to feedback from educators, mentors, supervisors, and experts to improve performance

1. Intern attended weekly or as arranged. **5.5**

2. Intern was on time when scheduled. **5.5**

3. Intern dressed appropriately. **5.5**

4. Intern maintained professional relationships with agency staff. **3.2, 4.3**

5. Intern maintained professional relationships with agency clients. **3.2, 4.3**

6. Intern understood the purpose and goals of the agency.

7. Intern behaved in accordance with ethical standards.

8. Intern maintained effective and supportive relationships with clients. **3.2, 4.3**

9. Intern participated effectively as a team member. **3.2, 4.3**

10. Intern actively asked questions and sought knowledge and experience. **5.2**

11. Intern accepted supervisory suggestions. **5.2**

12. Intern demonstrated level of clinical skill appropriate to level of experience.

1.   Please comment on the intern's strengths and areas of above average performance.

_____

_____

_____

2.   Please comment on areas in which growth and improvement would be beneficial.

_____

_____

_____

Please feel free to add additional comments concerning your intern's progress on the back of this page.

_____

Agency Intern Supervisor

Final Assessment Report, AY 2016-2017
May 20, 2017

Assessment in the Department of Women's and Gender Studies this year focuses on WGS 499, the Capstone in Women's and Gender Studies. Plans are in place to workshop a new assessment project for AY 2017-2018.

WGS 499 includes an eportfolio component, whereby students reflect on how their coursework throughout their years as a major has helped them to meet WGS learning outcomes (http://www.umassd.edu/cas/wgs/ - then scroll down). Using a UMD wiki created for the purpose, students upload papers and other written assignments illustrating the extent to which students have met each learning outcome. Students also write and upload a reflection statement in which they explain their own learning process relative to each learning outcome.

Until this summer, we have not had a large enough number of students completing WGS 499 to allow for a valid assessment process. We will assess electronic portfolios (eportfolios) completed by the total of 14 students who were enrolled in and who completed WGS 499 in Spring, 2015, Spring, 2016, and Spring 2017. Two eportfolio evaluators (WGS faculty Cristina Mehrtens and Anupama Arora) have been hired at $300.00 each. These evaluators, in addition to the co-chairs of the WGS Assessment Committee (Stephanie O'Hara and Heidi Berggren), will assess attainment of WGS learning outcomes among the 2015, 2016, and 2017 cohorts. Evaluators will use the WGS Eportfolio Rubric (attached to this report).

While the assessment results this summer will be analyzed, anecdotal evidence suggests that students fall short. Accordingly, we plan to pursue new avenues in improving outcomes.

Beginning in Fall (2017), the WGS department will meet at regular intervals to workshop an assessment strategy of mid-level, or bridging assessment. This will most likely involve the WGS 300 level feminist theory requirement, paired with our ongoing assessment of WGS 499. We hope to improve learning in the upper level theory class to set the stage for greater success in the capstone. At our meetings, we will also discuss ways to revise the rubric (attached) in order to improve the process of WGS 499 assessment.