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University of Massachusetts Dartmouth, College of Arts and Sciences

2018-2019 Annual Report on Program Assessment Activity and Implementation of the
Academic Quality Assessment and Development

Academic Quality Assessment and Development

The University continues to improve its ongoing review of academic programs through the Academic Quality Assessment and Development (AQAD), external accreditation reviews, and annual program assessment reviews. Academic Quality Assessment and Development (AQAD), an academic program review mandated by the UMass Board of Trustees and implemented independently on each UMass campus, operates on a seven-year cycle to evaluate program quality and effectiveness and identify strategies for improvement.

When appropriate, program reviews by external accrediting bodies are used in lieu of AQAD reviews. AQAD reviews include a Self-Study, an external review by faculty from two different institutions, and a final action plan. The campus has now completed two full cycles of AQAD program reviews.

During Academic Year 2018-2019, the College of Arts and Sciences (CAS) undertook one AQAD review in the Department of Chemistry and Biochemistry. The Department offers a BS in Chemistry/Biochemistry, an MS in Chemistry/Biochemistry and a PhD in Chemistry/Biochemistry.

The Department of Chemistry and Biochemistry, like all College of Arts and Sciences' departments, has learning outcomes, curriculum maps, and established assessment plans. The assessment process in CAS are designed to allow flexibility for each program to identify, develop, and assess learning within the major, while also providing guidance, parameters, and timelines aimed toward appropriate curriculum assessment and revision. During AY 2018-2019 Associate Dean Robert Jones coordinated assessment in the college. He worked with a designated faculty coordinator in each department to develop its assessment plan using a "best practices" approach.

The Department of Chemistry and Biochemistry completed the final draft of its self-study in September of 2018. External reviewers, Drs. David Ryan (University of Massachusetts Lowell) and Glen Miller (University of New Hampshire), visited the University of Massachusetts Dartmouth campus on Thursday, November 29, 2018. They submitted a review subsequent to their site visit.

The department has clearly articulated learning outcomes and approaches assessment in a comprehensive way. The Department continues to develop new assessment instruments that will best gather the needed information to move the program forward.

Dean Pauline Entin shared the reviewers' concerns and concurred with some of their recommendations. The Dean also felt the department should address additional concerns not mentioned by the external reviewers. She charged the department with producing an action plan that addressed each concern and provided a timeline for activities to address those concerns.

During March of 2019, Department of Chemistry and Biochemistry submitted a final action plan that addresses Dean Entin concerns. The plan details the program's actions for each academic year through AY 2023 – 2024.

Academic Department/Program Assessment Activity

Each department/program submits to the Dean's Office an annual assessment report that aligns with NECHE and the University of Massachusetts' Academic Quality Assessment and Development (AQAD) assessment criteria, to help departments continue to make progress and collect significant data for efficient and effective review. What follows is a summary of each review.

Annual program reviews are accomplished through annual departmental assessment. In the College of Arts and Sciences (CAS), an Associate Dean manages assessment activities in the college. In previous years, a member of the CAS faculty served as College Assessment Coordinator. Each academic department has established learning outcomes for their programs that may change given changes in the discipline or analysis of new data on the department's success in achieving the stated outcomes. One or more faculty members in each department coordinate assessment activities in the department. The department assessment coordinator submits a preliminary report during September of the academic year that outlines the department's assessment plan for the year. Possible assessment strategies include review of student papers and other artifacts, embedded key questions, student surveys, alumni surveys and gathering of other observable data. Rubrics appropriate to the department outcomes are used to analyze the collected artifacts and data. The Associate Dean reviews the plan with the coordinator and provides suggestions and guidance when needed. The department coordinator submits a mid-year progress report in December to illustrate the progress made by the department and outline and changes to the preliminary plan. The department coordinator submits the final annual assessment report in May of the academic year.

Examples of AY 2018-2019 Activities

The following are three examples of yearly activity in the College of Arts and Sciences.

Department of Economics

The Department of Economics assesses learning outcomes at all course levels. During AY 2018-2019, the department collected data from three different sources:

1. Student papers from:
ECO445: Economics of Education (Spring 2019)
ECO461: Urban Economics (Spring 2019)

ECO475: Healthcare Services Administration and Management (Spring 2019)

2. The key questions for: a. in microeconomics embedded:

ECO301 Intermediate Microeconomics course offered in Fall 2018

ECO 300 Mathematical Economics course offered in Spring 2019

3. Oral presentations from:

ECO231 Honors Section (Fall 2018)

ECO338: Health Economics (Spring 2019)

The department has completed six years of assessment of student papers from 400-level courses. Each paper is read and assessed by two or more faculty members. The mean scores across faculty members and 267 papers were presented. The department uses its own rubric which assigns the following point values: Exemplary - 4 points, Meets Expectations - 3 points, Needs Improvement - 2 points, Unacceptable - 0 points.

Table 1: Mean Assessment Scores for 400-Level Writing	
Criteria	Mean
Application of Economic Concepts	2.93
Comparison and Evaluation of Costs and Benefits of Government Policy	2.54
Written Communication	3.04
Control of Syntax and Mechanics	3.00
Source Integration	2.71
Source Documentation	2.66
Number of observations	267

The mean values for source integration and source documentation criteria are 2.71 and 2.66, respectively. This suggests that students' writing is in need of improvement in information literacy. The weakest criterion appears to be "comparison and evaluation of costs and benefits of government policy," with a mean of 2.54. The department's next steps are to update the 400-level paper assessment data with information on students who completed the intermediate writing course (ECO350) before completing their 400-level course. The mean values in Table 1 come from three groups of students pooled together: (1) those who wrote 400-level papers before taking the writing class; (2) those who were concurrently taking the writing class; and (3) those who wrote 400-level papers after taking the writing class. Thus, we have "before," "during," and "after" groups that we can use to compare results. In this way, the department can assess the effectiveness of the intermediate writing course.

The addition of ECO 300 Mathematical Economics as a required course in the major resulted from prior assessment activities. The department observed that successful completion of this course was highly correlated to success in upper division courses.

The department assessed students' answers to the key questions for mathematical economics (embedded in ECO300 exams) using the Quantitative Literacy Rubric attached at the end of this document. The mean scores for the mathematical economics key questions from 105 students

(collected from 4 exams) are presented in the table below. Our rubric assigns the following point values: Exemplary - 4 points, Meets Expectations - 3 points, Needs Improvement.

Table 2: Mean Assessment Scores for Mathematical Economics Key Questions	
Criteria	Mean
Representation	3.58
Interpretation	3.03
Calculation	3.23
Application/Analysis	2.77
Number of observations	105

The weakest criterion among the four criteria appears to be “application/analysis,” with a mean of 2.77. This criterion is meant to measure students’ ability to make judgments and draw appropriate conclusions based on the quantitative analysis of data. According to the results in Table 2, students are in need of improvement in this area. Faculty in the department are working of course revisions to address this need.

Department of Crime and Justice Studies

The Department of Crime and Justice Studies carried out several assessment related activities during AY 2018 – 2019. Using a rubric designed to identify strengths and areas for further development in coursework, curricular mapping, and overall program design, the department has identified the following:

1. CJS has a series of courses that would benefit from redesign as to better reflect and engage the programmatic learning outcomes, which will in turn better prepare students to move through the CJS curricular map and meet desired outcomes. The following courses qualify for application to the CAS Dean's Curricular Redesign and Innovation Grants.
 - a) Redesign introductory courses: CJS 190, CJS 205
 - b) Redesign course CJS 257; CJS 258, CJS 315, CJS 380
 - c) Present sequences to better prepare for CJS 400 and CJS 450:
 - i. Sequence #1: CJS 257-315-400 research and writing;
 - ii. Sequence #2: CJS 258-380-450 for praxis;
 - d) Redesign CJS 400 to detail specific learning outcomes of a capstone course that is reflective in its content of the entirety of the CJS
 - e) Redesign CJS 450 to detail specific ethics and professionalism in the field components and final assessment in CJS praxis
 - f) Develop CJS electives that build and reflect program content and learning outcomes, as well as contribute to a curricular map. Electives should expand and deepen the core-required content. To do so in skill level, we will begin offering electives at the 200 level and hope to offer "Advanced"

courses in crime and justice in the future.

- i. 200 levels: Digging for Justice, History of Forensics, Prison Writing, Transnational Gender Justice; Media, Crime and Justice;
- ii. 400 level: Advanced Theories, Methods, and Topics Courses to complement new concentrations, minors, etc.

The faculty began further discussion about how the CJS inside/out program fits into the curriculum sequencing. Students identified a need for a sustained engagement with the inside/out program learning objectives in their other classes.

2. Redesign for Transfer Students (2-year completion)

Four semesters or two academic years if students have CJS 190 and University Studies/College Requirements that transferred in appropriately (i.e. Mass Transfer):

First term: CJS 205; CJS 257

Second term: CJS 258; CJS 315; one 300-400 level

CJS elective Third term: CJS 380; CJS 400; one 300-

400 level CJS elective Fourth term: CJS 450; two 300-

400 level CJS electives

Action Area 2: Expand and Improve Experiential Learning Opportunities

The Crime and Justice Studies program values experiential learning opportunities that spur the development of globally minded citizens. The program seeks to structure its experiences abroad in ways that respectfully engage with the scholarship and voices of non-U.S. scholars and students and challenge, rather than replicate, the racialized inequalities between nation-states. The program does so by critically investigating the impact of the U.S. in the world, amplifying Global South voices, and building long-term partnerships with community partners in study abroad sites through support and mutual engagement. Faculty have begun further discussions as to how these courses fit into the sequencing and curricular maps.

1. The CJS Study Abroad Program in Mexico offers students the opportunity to earn credit for CJS requirements through a short-term experience in southern Mexico. Working closely with community partners, the program allows students to explore and understand highly innovative models of justice, and CJS students have described it as a life-changing experience. The department strives to continue to develop its study abroad programming to ensure its sustainability and accessibility for students, faculty, and community partners. In particular, we have identified the need for increasing the credit offerings of this program from 3 to 6 credits and have begun work on developing a proposed lab portion of the course that more adequately reflects the work the students are doing abroad.

2. Alternative Winter/Spring Break at Plenitud de Puerto Rico, a permaculture farm in Las Marias, Puerto Rico. This program engages participants in the research, learning, and practice of environmental and food justice, sustainability, and the political, economic, and social impacts of Hurricane Maria and US colonialism in Puerto Rico. Faculty and students live and work directly on the permaculture farm and participate in numerous activities such as organic farming and herbalism, water filtration and bio-construction, sustainability chores and maintenance, and working with local high school students and other community members to rebuild their landscapes. This alternative break trip offers faculty and students numerous physical, emotional, intellectual, political, and social challenges that result in a transformative experience for everyone within a short amount of time. Faculty, students, and Plenitud staff work collectively to create ways to accomplish the tasks, overcome challenges, grow relationships, and expand the praxis of justice. Faculty and students have identified the need to incorporate this experience with credit offerings. Discussions have begun to consider this a CJS 450 option or an upper- division elective.

Assessment results will inform the development of the department self-study for its AQAD review during AY 2019 – 2020.

Department of Biology

The department assesses content knowledge using the Major Field Test in Biology. During AY 2017 - 2018, BIO faculty mapped the upper-level courses to the content areas of the major field test. The MFT provides subscores for each student in four areas: Cell Biology, Molecular Biology and Genetics, Organismal Biology, and Population Biology, Ecology, and Evolutionary Biology. For each of the upper-level electives, BIO now has a value for the percentage of content falling in each area.

Using data from stored electronic versions of their transcript evaluations, faculty can say which upper-level electives each student took, and create a score for the number of courses taken in each content area. They offer an example: student A.I. took BIO 310, BIO 321, and BIO 333. Approximately 15% of the content in BIO 310, 10% of BIO 321, and 90% of BIO 333 falls in Area 2, Molecular Biology and Genetics. Therefore, student A.I. is scored as having 1.15 courses (.15 + .10 + .90) in Area 2.

Data are available for 216 students graduating between Spring 2016 and Spring 2019. BIO faculty used the data to ask whether the number of courses taken in an area affects the area subscore (regression of area subscore on number of courses taken), and whether taking particular classes is associated with a higher area subscore (t-test comparing area subscore of students who did take the course with area subscore of students who did not take the course).¹

¹ A new version of the MFT was introduced in 2018/19. Percentiles are not yet available for the new test, and raw scores (% correct) may not be comparable between versions of the test. The analysis will be repeated using percentiles when they are provided.

Area 1: Cell Biology. The number of courses taken is unrelated to MFT subscore ($p = 0.355$). Area 1 subscore is not higher for students who have any single course with 50% or more content in Area 1 (BIO 321, 427, 431, 434). BIO 434 has about 85% Area 1 content, but was taken by only 22 students. The other courses had 66% or less Area 1 content.

Area 2: Molecular Biology and Genetics. The Area 2 subscore significantly increases with the number of Area 2 courses taken (an increase of about 7 points for 1 full course; $p < 0.001$, $R^2 = 0.15$). The average score is greater for students who have taken BIO 333 (General Genetics; average increased by 7 points, $p < 0.001$) and BIO 427 (Molecular Biology; 6 points, $p < 0.001$).

Area 3: Organismal Biology. The number of courses taken is unrelated to MFT subscore ($p = 0.516$). Although the department offers a large number of courses focused on organismal biology, most are focused on a particular taxon and are not associated with increased Area 3 subscores. The only course that results in higher Area 3 scores is BIO 415, Comparative Vertebrate Anatomy (5 points, $p = 0.013$).

Area 4: Population Biology, Ecology, and Evolutionary Biology. The Area 4 subscore significantly increases with the number of Area 4 courses taken (an increase of about 4 points for 1 full course; $p < 0.001$, $R^2 = 0.07$). The average score is greater for students who have taken BIO 314 (General Ecology; 5 points, $p = 0.007$) and BIO 437 (Evolution; 6 points, $p < 0.001$).

These results were applied to a large-scale curricular revision in the BIO major. The major now features several concentrations. The assessment results informed the course sequencing in the various concentrations.

Content knowledge: 200-level Foundations courses

Prior assessment of the curriculum suggested that additional courses were needed at the 200-level. Those courses were offered for the first time during this academic year. Each individual instructor has done some assessment of student learning, but the results have not been analyzed and discussed.

Graduate Program

Last year, the assessment committee designed a rubric for scoring the thesis/dissertation proposal and the thesis/dissertation. This year, rubrics were distributed to advisors at the time of each proposal defense and each thesis/dissertation defense. Completed rubrics are still being collected and will be available to be analyzed beginning next fall.

Course-level Assessment Workshop

Biology faculty participated in a workshop on course-level assessment. The workshop focused on how to write meaningful student learning objectives for a course.

Plan for 2019-20

Priorities for next year include

- A comprehensive plan for assessment of student learning in the new 200-level Foundations courses
- Discussion of upper-level electives in light of Major Field Test results, both within the committee and with the rest of the department
- Continued collection and analysis of rubrics for graduate theses/dissertations and proposals

Overall Commentary on College Assessment

As assessment coordinator, I made the following suggestions to several departments

1. After several years of assessment and closing the loop, an examination of learning outcomes may be appropriate. Have the focus or goals of the program changed? Should program outcomes change to address the change in focus?
2. Assessment should expand to all course levels. In doing so, programs can guarantee that material is introduced, reinforced and that students are able to show mastery at appropriate points during their academic careers.
3. Programs must carefully develop Baseline Standards for student achievement. A key part of assessment is to learn where our students are now relative to where we would like them to be. What should a typical student score given the current state of the program? What is the target? How does the level differ, if at all, between majors and minors? Beginning with a rational baseline will allow you to spot trends and show improvement.
4. Some Issues to consider when using Rubrics: I assume that the faculty in the department reached some consensus about the descriptions of the SLOs and the levels of achievement. Lacking this consensus, the individual faculty evaluation can be inconsistent and therefor invalidate results.
5. Data Collection Instrument: The value from assessment is that it allows us to gather program specific information that leads to improved outcomes for students. When gathering data so-called *Local Instruments*, instruments produced by the faculty of the program under assessment, often provide the best quality data. Leveling of scores across evaluators is always a concern when using this type of instrument.

Department of Economics Program Outcomes

After completing the major in economics, students will be able to:

- Explain fundamental theories, concepts, and analytical methods of microeconomics and macroeconomics.
- Apply the general concepts learned from principles of economics to specific fields of economics.
- Apply mathematical tools and techniques and evaluate the results obtained from such application to analyze economic problems.
- Compare and evaluate the costs and benefits of various government policies.
- Communicate, in writing and orally, fundamental economic theories, concepts, analytical methods, and policy choices.

Department of Economics Quantitative Literacy Rubric

Economics Department Quantitative Literacy Rubric

The artifacts should demonstrate the student's mastery of the following program-level learning objectives:

- Apply mathematical tools and techniques and evaluate the results obtained from such application to analyze economic problems.
 - Recognize when to use and correctly apply mathematical tools and techniques in analyzing economic problems.
 - Use the results obtained from the application of mathematical techniques to analyze a range of economic problems.

Criteria	Exemplary (4 points)	Meets Expectations (3 points)	Needs Improvement (2 points)	Unacceptable (0 points)
Representation <i>Ability to convert relevant information into various mathematical forms</i>	Skilfully converts relevant information into an insightful mathematical portrayal.	Competently converts relevant information into an appropriate and correct mathematical portrayal.	Completes conversion of information but resulting mathematical portrayal is only partially appropriate or accurate.	Completes conversion of information but resulting mathematical portrayal is inappropriate or inaccurate, or does not complete conversion of information.
Interpretation <i>Ability to explain information presented in mathematical forms</i>	Provides accurate explanations of information presented in mathematical forms. Makes appropriate inferences based on that information.	Provides accurate explanations of information presented in mathematical forms.	Provides somewhat accurate explanations of information presented in mathematical forms, but occasionally makes minor errors related to computations or units.	Attempts to explain information presented in mathematical forms, but draws incorrect conclusions about what the information means, or does not attempt to explain information.
Calculation	Calculations attempted are essentially all successful and sufficiently comprehensive to solve the problem. Calculations are also presented clearly, concisely.	Calculations attempted are essentially all successful and sufficiently comprehensive to solve the problem.	Calculations attempted are either unsuccessful or represent only a portion of the calculations required to comprehensively solve the problem.	Calculations are attempted but are both unsuccessful and are not comprehensive, or calculations are not attempted.
Application/Analysis <i>Ability to make judgments and draw appropriate conclusions based on the quantitative analysis of data</i>	Makes thoughtful judgments, drawing insightful conclusions from the work.	Makes competent judgments, drawing reasonable conclusions from the work.	Makes basic judgments, hesitant or uncertain about drawing conclusions from the work.	Draws incorrect conclusions about the work, or does not use the analysis as a basis for judgment.

Department of Crime and Justice Studies—programmatic learning outcome criteria

1. Identify and contextualize core theories, methods, and texts in our fields;
2. Apply Crime and Justice concepts to personal, community, and global experiences;
3. Present and communicate organized and coherent arguments in written and oral forms;
4. Demonstrate historical and contemporary understandings of the criminal justice system, injustice, institutionalized violence, and structural oppression;
5. Distinguish and make connections between transnational structures of power (e.g., racism, sexism, heterosexism, classism, ageism, ableism, etc.) and how these intersect with criminal justice systems;
6. Explain the importance of intersectionality as theory, method, and praxis; and
7. Evaluate the utility of multiple justice frameworks including, but not limited to: criminal justice, transformative justice, restorative justice, transitional justice, international criminal courts and tribunals, truth and reconciliation commissions, and transnational justice.

Department of Biology Learning Objectives

Undergraduate program

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

Graduate program

The department has established learning objectives in three areas:

- 1) Content knowledge
 - Students will develop an advanced theoretical and conceptual framework in a subdiscipline of biology.
- 2) Critical thinking and analytical and technical skills: Students will apply the methods of scientific inquiry in an independent research project. Each student will be able to
 - evaluate the published research on a particular research topic
 - plan an independent research project, including designing experiments to test specific hypotheses
 - complete all data collection for the project
 - analyze and interpret data collected
- 3) Written and verbal communication skills: Students will communicate the results of an independent research project.
 - Each student will describe the project's purpose, methods, results, and their interpretation in a written thesis.
 - Each student will present and defend verbally the research project's results in a public setting.

