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An Analysis of Exams Using the Three Dimensional Learning Assessment Protocol

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Abstract

In the science, technology, engineering, and mathematics (STEM) fields, there is an intrinsic problem wherein students graduating into those fields are unprepared for the work they have to do. In order to prevent this issue, the Three Dimensional Learning Assessment Protocol (3D-LAP) was developed. The 3D-LAP is made of three standards: Scientific Practices, Cross-Cutting Concepts, and Core Concepts, and these were used to analyze exams given in five courses at the University of Colorado Boulder (CU). The study found that many of the questions on these exams did not meet all of the standards given by the 3D-LAP. Although there were some questions met one or two of them, the trend suggested that these were in same cases due to the nature of the course rather than the depth of the question. These results indicate that teachers at CU should reexamine and reevaluate their exams using the 3D-LAP in order to understand how the questions could be improved. By doing so, the questions will focus more on testing students on their abilities to succeed in the field rather than their abilities to succeed on a test.

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Introduction

Something widely considered to be of the utmost importance in science teaching in the United States is making sure that students, when they enter into their careers, have the abilities and understanding to do the jobs that they are being asked to do. Concerns have cropped up showing that students graduating from high school and college and going into science, technology, engineering, and mathematics (STEM) do not have the necessary knowledge to excel in their fields. These concerns and evidence supporting them can be seen in reports produced over the past several decades, such as “A Nation at Risk: The Imperative for Educational Reform” by Gardner et al. in 1983 and “Engage to Excel: Producing One Million Additional College Graduates with Degrees in Science, Technology, Engineering, and Mathematics” by Olson and Riordan in 2012, which also urge changes in STEM prevent this. In their 2007 paper “Rising Above the Gathering Storm”, the National Research Council claims that the United States might lose it’s lead in scientific prowess so long as these issues are not addressed. From the findings from these papers it can be concluded that providing students with the teaching that they require and making sure that they understand that teaching is an area for teachers in STEM fields to evaluate and improve upon.

To better understand why this problem exists and how to fix it, it is useful to examine how teaching has progressed. Most people are familiar with lecture teaching, which is a standard in universities and can often be used in high schools as well. This approach to teaching began to be examined and changed around the 1950s and 1960, around which time inquiry learning began to gather traction in STEM teaching (McDermott, 1991). Inquiry learning is a form of learning that is meant to mimic the process by which scientists discover knowledge - that is, by exploring the knowledge that already exists, posing a question, performing research or experiments to answer that question, then understanding and discussing the results (Pedaste et

al., 2015). This sort of learning would not only allow for students to better understand how science works for scientists, but also for them to focus on questions that they are interested in, hopefully driving an interest in science as a whole. This kind of learning was shown to be more effective for students and was a step forward in deepening students' understanding of science (Windschitl, 2002; & Hmelo-Silver, Duncan, & Chinn, 2006).

Even with the addition of inquiry learning, a problem still clearly stands today, and teaching is in clear need of more study and more reworking. It has been noted that there is a difference between learning 'simple' science skills, versus learning 'authentic' science skills, that means that students are still not be picking up the required abilities that they need (Chinn & Malhotra, 2001). Simpler science tasks require less time and less ability to carry out, and are easier to understand. These are the sorts of science tasks that are often used to teach students in elementary, middle, and often high school. They might be necessary, given the time and financial restraints that schools have, but they cannot replicate the actual experience of being a scientist and performing actual research (labelled authentic science skills by Chinn and Malhotra). Moreover, there has been research showing that inquiry learning, although more effective than lecture learning, is still not entirely sufficient to keep students interested and might not change the way they feel about science (Khishfe & Abd-El-Khalick, 2002; Meichtry, 1992; Sandoval & Morrison, 2003). It is also the case that even if classes are taught with inquiry learning in mind, students might turn to rote memorization in order to learn the material, despite knowing that memorization is not the best means of comprehending and maintaining information (Elby, 1999). Because of issues such as these, it becomes important to have a way of checking that students are gaining the skills that they need. For this reason, having assessment questions that ask students to demonstrate the required skills is a good idea. It is known that critical thinking skills scientists use every day can be taught in a classroom (Chang & Barufaldi, 2001).

However, it is also the case that critical thinking skills will be lost if they are not practiced, and will be useless unless they can be applied to other situations (Halpern, 1998). This supports the need for a means of assessing whether or not students have learned the required skills, particularly if the issue isn't that the skills can't be taught. Having the proper assessments to understand if the students are receiving the right information can also provide feedback to teachers, to make sure that their students aren't turning to rote memorization in order to pass a test, and are engaging with the subject beyond just the basic content of the course.

The feedback could be useful to the students as well as the teachers. Error-based learning requires a person to know that something is an error in order to learn from it. For that reason, learning can also require feedback, often in the form of tests, to let a student know how they're performing (Schraw, Crippen, & Hartley, 2006). However, even if a student didn't make a mistake, it can be useful to students to receive feedback on their work. Positive feedback can improve self-efficacy, as can setting goals for oneself, such as receiving a certain grade on a test (Bandura, 1993; Schunk 1996). For that reason, assessment questions that include testing students on scientific skills could provide the students with valuable feedback about their scientific knowledge and might influence their self-efficacy in the field of STEM.

With an importance being placed on making sure that students and teachers are receiving the feedback they need to make sure that they're learning the necessary skills for their field, the question turns to how teachers can be sure that their assessment questions are testing students on all parts of the field. Multiple guidelines have been produced for this purpose, such as the Next Generation Science Standards (NGSS) and a K-12 Science Education Framework (K-12 Framework), which have been used in schools to organize science curriculums. These standards were invented as a means of making sure that students are receiving the instruction that they need. However, these standards are for K-12 schools, and do not extend to

universities. For this reason, the Three Dimensional Learning Assessment Protocol (3D-LAP) was developed, using much of the structure of the K-12 Framework, but applying it to college level courses. For the purpose of this paper, the 3D-LAP was used to examine assessments from certain courses, and so will be discussed in further detail.

As mentioned, the 3D-LAP shares much of its structure with the K-12 Framework. The focus of the protocol is also on Biology, Chemistry, and Physics, though some parts of the protocol could apply to other fields of STEM as well. In order to determine how successful an assessment question is at asking students about their application of knowledge, the protocol focuses on three different dimensions of a question - scientific practices, cross-cutting concepts, and core ideas. The first dimension, scientific practices, is meant to check that students are asked about the scientific skills that they would use in a professional setting. For instance, one standard is Developing and Using Models, which would check that students understand how models can be used to make sense of complicated concepts, and that students can interpret models that they might see in research. Other standards might ask about the use of math in science, or ask students to explain how to set up an experiment, or interpret data.

The cross-cutting concepts dimension is meant to examine whether or not students are learning concepts that can be applied to other fields, rather than being specific to their own field. Rather than being the actual skills of performing science, like the scientific practices, the cross-cutting concepts ask students about knowledge and skills that apply to learning knowledge from any field. An example of this is the standard Patterns and Processes which asks students if they can determine a pattern emerging from a certain process, or if they can induce a specific process from an observable pattern. Although not explicitly skills that a scientist might use to perform an experiment, these are nevertheless important skills to have when working in science, particularly in analyzing data and drawing conclusions.

For an assessment question to meet the core standard, it must ask the students about the semantic knowledge that the field is meant to teach. In the case of the 3D-LAP, this means that there is a list of points that the developers believe cover the core knowledge of the field, and the question must ask about one of those points. The elements of the list are written so as to cover the overall important points of the field; as an example, one of the elements for biology is Chemical and Physical Basis of Life, which could cover anything that refers to chemical or physical interactions related to biology. The core standards are different for each field, though the other two dimensions remain the same.

The 3D-LAP was designed by a team of self-identified discipline-based education researchers, whose objective is to “be able to recognize assessment tasks that can elicit evidence of three-dimensional learning” (Laverty et al., 2016). The development team was aided by faculty outside of the team as well, in order to get further feedback on the standards they developed. Those standards were developed by using the K-12 Framework as a basis, applying it to assessment questions, and then revising the standards where needed.

The 3D-LAP has previously been used to measure assessment questions, particularly in the field of chemistry. For instance, several organic chemistry questions from several universities failed to meet the 3D-LAP standards (Stowe and Cooper, 2017). It was also seen that students given a lab that matched the 3D-LAP standards performed better than students that received a different lab (Carmel, Ward, & Cooper, 2017). This evidence would suggest that the 3D-LAP can be useful when implemented, and hasn’t been utilized by many classes. Because it is a relatively new, the 3D-LAP could benefit from further research into its benefits in a classroom.

To that end, this paper aims to examine assessment questions in biology, chemistry, and physics classes at the University of Colorado at Boulder (CU) using the 3D-LAP. It poses the

question of whether CU assessments in those fields test students on not just the content of the class, but also all of the three dimensions posed by the 3D-LAP. By providing feedback on those assessments, the courses may be able to consider the questions they ask, and possibly alter them to provide students with a course that includes more scientific experience. It will furthermore provide some information on the state of university coursework in the United States, which can be used for further research.

Methods

Assessments were gathered from five different courses at CU. The courses gathered from were a 1000 level EBIO class, a 2000 level EBIO class, a 1000 level CHEM class, a 4000 level CHEM class, and a 1000 level PHYS class. The number of exams assessed per course depended on the number of exams the professor of the class was willing to provide, and ranged from three to four exams. The 1000 level EBIO class was split into two parts, A and B, for analysis. This was because the course was taught by two different instructors, so their exams were looked at separately. The courses, including the two sections of the EBIO class, will be referred to as Courses 1 through 6 for the sake of anonymity. For all exams except for Courses 1 and 4, all questions were assessed using the 3D-LAP. For the Course 1 and Course 4 exams, some of the questions were disregarded due to similarity with questions that had already been assessed. The questions that were disregarded were nearly exactly the same as questions that had already been analyzed, with the potential of different numbers in the questions.

The questions were assessed by comparing the question to the 3D-LAP criterion for each of the three dimensions. If the question matched at least one criterion in a dimension, a “1” was recorded for that dimension, and the criterion that it matched was recorded. If a question met two criteria, both were recorded. No more than two criteria were recorded per question. If

no criteria were matched, the question received a “0”. Also recorded was the year of the exam, the course number, the exam number, and the question number. A criterion was added to the Scientific Practices portion of the 3D-LAP, Visualizing Information, as it was thought to be an important practice that was not necessarily covered by the other standards.

Once the data was collected, Python was used to analyze the data. The average score (from 0 to 3, one for each dimension) was found for each course, and the number of occurrences of each criterion for each dimension was found. The code used to analyze the data can be found in Appendices B and C.

Results

The data was analyzed to find the number of occurrences of each criterion for each course, as well as to find the number of questions that met at least one criterion. To view the results for each individual course, please refer to the Figures and Graphs section. To make sure the graphs were legible, codes were used in place of the actual criterion titles. Those codes will also be used in this results section.

There were 463 questions assessed over all of the courses. Of those 463 questions, 204 of them met one or more Scientific Practice criteria, 116 or more met some Cross-Cutting Concept criteria, and 406 met at least one Core criteria. The total number of occurrences for each individual criterion can be viewed in Figures 1.2 - 1.4.

All of the seven Scientific Practice criteria were met at some point. The criterion with the most questions meeting it was AD with 115 questions, and the criterion with the least number of questions meeting it was AF with 3 questions. The AD and AA criteria had the majority of questions meet them, with 199 questions out of 204 that met a criteria meeting them. To see

individual scores for the courses, see Figures 2.1-2.5. Please note that Course 5 does not have a Scientific Practice table as no question met any of the criteria.

Of the six Cross-Cutting Concept criteria, each criterion was also met by at least one question. The criterion with the most occurrences was BB with 42 questions, and the one with the least was BF with 2. The top two criteria with the most occurrences accounted for 77 of 116 questions. Figures 3.1-3.6 show the results of the Cross-Cutting Concepts for the individual courses.

There were seven criteria for the Biology Core section. The criterion with the most questions meeting it was CF with 96 occurrences, and the one with the least was CG with 10. CF and CE had the two largest amounts of occurrences, summing to 142 questions accounted for from 289 that met the criteria.

Each of the four Chemistry Core criteria was met by one or more questions. Of the 131 questions that met a criteria, the criteria with the most questions was EB with 39, and the one with the least was EA with 20. The two criteria with the most questions meeting them summed up to 68 questions between them.

There were five Physics Core criteria, but only three of them were met by at least one question. The one that was met the most was DA with 49 of the 58 questions that met a criteria. The criterion with the least questions, apart from the two that had none (DD and DE), was DC with 1 question meeting it. Overall for the Core criteria, there were 406 questions that met a criteria. The Core data for the individual courses can be seen in Figures 4.1-4.7. It should be noted that Course 3 has a Core graph for both biology and chemistry, as both of those standards applied.

The average scores for the questions in each course was also calculated. The results can be seen in Figure 1.5. The highest average score was 1.88, and the lowest average score was 0.87.

Discussion

The results of this study indicate that there is a lack of focus on Scientific Practices and Cross-Cutting Concepts in exams. The Core requirement was met by most of the questions, but there were many that did not meet any of the Scientific Practice criteria, nor the Cross-Cutting concept criteria. It is reasonable for exams to have a larger number of Core questions, as the purpose of the courses was to teach core information, after all, but not even half of the questions were accounted for by the Scientific Practices and Cross-Cutting Concepts. A possible reason for this could be that many of the courses used largely multiple-choice questions on the exams. The 3D-LAP acknowledges that it is hard for multiple choice questions to get the breadth of a student's understanding of Scientific Practices as they don't ask students to replicate the sort of processes that scientists use in their research. It is therefore less likely for a multiple choice question to meet Scientific Practice standards. However, multiple choice exams come with their own advantages. For instance, students are able to complete multiple choice questions more easily, which means they can be tested on a larger amount of knowledge in the allotted time. It is also the case that many 1000 and 2000 level courses have hundreds of students in them, and grading short answer or essay questions for all of those students is a much longer and more exhausting undertaking than grading multiple choice questions. For this reason, it may not be feasible for teachers in lower level courses to offer questions that ask about Scientific Practices. For an example of a question that does meet all of the 3D-LAP standard, see Appendix A.

Of the questions that did ask about Scientific Practices, two of the criteria tended be applied more often than the others. Both AA (Developing and Using Models) and AD (Using Mathematics and Computational Thinking) were more than 80 times, as compared to the next criterion with the next highest amount of questions, which was only 19. Although the means used to assess these questions gave each question a point so long as it met any of the criteria, it should be noted that many of these courses did not offer questions asking about all of the Scientific Processes, but instead looked largely at the mathematical part of it, or the part of it that uses models. While these are useful skills to have, they are also practices that tend to relate to the core knowledge being taught. For instance, several ideas in STEM are easiest to teach and understand when represented by models (for instance, atoms in chemistry) or when related to mathematics (how objects interact with each other in physics). It is for this reason that teachers could find it useful to reexamine their test questions alongside the 3D-LAP and ask how much the aspects of actual science research are being tested. It is also important to note here that many of the classes examined in this paper had accompanying lab classes, the tests of which were not examined. The purpose of the lab classes may be to teach and assess the students' ability to perform science. If this is the case, then some courses may not need to have as much focus on Scientific Practices, so long as there is a focus on them in the lab courses. However, there could be some benefit to professors in higher level courses reassessing their test questions for Scientific Practices, so that students are continually tested on their skills beyond a lab course. This might help eliminate some of the issue of students memorizing concepts for the sake of passing a course rather than learning the methods behind the answers.

There were even fewer questions that met any of the Cross-Cutting Concept criteria than the Scientific Practices criteria. The purpose of the cross-cutting concepts is to help students understand that many ways of thinking in STEM are applicable to multiple fields. The reason

why so few of the questions met a Cross-Cutting Concept criterion may also be related to how the exams had so many multiple choice questions. As mentioned before, for the purpose of expediting the exam process, questions may not have been able to ask about much more than the core of the class. It may also be more difficult for teachers looking to improve their exam questions to focus on asking questions about these criteria. After all, to add in a core requirement a question only needs to ask about the knowledge the class is teaching, but to add in a scientific practice requirement, a question needs to ask about explicit methods of running or analyzing research. Trying to find a way to write questions so that they ask about a way of thinking is a little bit more abstract, and may require some creative thinking on the part of the teachers. That being said, it would be worth it in order to make sure students are fully prepared to graduate. There would also be some benefit to teaching students how to learn how to think about science more than teaching them the basic facts of science. For an example of a question that does meet a Cross-Cutting Concept criterion, refer to Appendix A. It can also be difficult to define what a “way of thinking across fields” would be. There are classes, for instance biochemistry classes, that teach knowledge that applies to two or more fields (biology and chemistry, for example), but that meeting of fields might not meet a Cross-Cutting Concept criterion if the question still asks the student to recite knowledge rather than to discover knowledge via a specific way of thinking. For the questions that did meet a criterion, the spread of Cross-Cutting Concept criteria met was a little more even, even though there is still a large gap between the one met the most and the one met the least. In this case there weren’t criteria that matched easily with Core concepts, but it could still be beneficial to examine which criteria show up more on tests.

The Core section, out of the three sections, had the most questions meet it. The Core part of the 3D-LAP is meant to note whether questions are discussing basic principles important

to understanding the field as a whole, as opposed to questions that are specific to one aspect or questions that don't focus on basic knowledge. In this case of this study, it is important to note that not every question met a Core criterion. This could be because the question was asking about methods, rather than about specific concepts, or because the question was about something that the professor found important, but that didn't necessarily meet the 3D-LAP Core standards. In cases like these, it is likely fine for a question not to meet a Core criterion. There were several questions that did not meet a Core criterion because what was being asked was not Similar to the Scientific Practices and Cross-Cutting Concepts, many classes had specific Core criterion that their questions met more often than others. In a different vein, however, those highest-met criteria tended to differ from course to course. Many classes tend to focus on a few parts of the field in greater specificity than other parts of the field, which could explain this difference. Only six courses were part of this study, so these classes do not necessarily represent the whole of Core in CU, which is to say that other classes in the same field likely cover other Core criteria in great detail. A teacher looking to improve upon their Core standard should focus more on making sure that the Core basics being covered are Core for the whole field, and something that can be used by students later on, rather than something specific to the class.

Through the course of this project, there were a few problems that prevented collecting the ideal data for this sort of research. The collection of exams for the research, for instance, relied on teachers being willing to provide exams as well as teachers providing them in a timely manner. Handing exams out to someone who is not a trusted coworker might have been off-putting, and so limited the number of exams received. Furthermore, teachers and professors specifically are often very busy with various responsibilities, and so may not remember to provide exams. Therefore the data provided here does not cover a large scope of CU, though it

is still important information for the teachers whose exams were included and could be a starting point for further introspection at the university.

Had there been a greater number of exams, there would still be the issue of time with which to run this research. It was not feasible to run research that would look more closely at the effects of changing some questions to match the 3D-LAP better, which would be an interesting study to run. There also would be a benefit to including teacher reactions to the data gathered that simply could not be done in the time given. Time also prevented getting assessments of the exams from multiple people, which would have benefitted the study by reducing the subjectivity of the assessments. The scoring of the exam questions is highly subjective, and so two different people could have very different takes on each question. Averaging the scores between multiple people could go some way to reducing that, though it could add to the time that would be needed to run the study.

There is also the issue of how changing the exam questions to better match the 3D-LAP standards could be detrimental to a class. It has already been discussed that longer questions that include every standard would make tests too long and too complicated to grade for very large classes. It is also very likely that changing the questions would make them more complicated and therefore likely to face some backlash from the students. In the case of many students, the concern is more about passing the class than assessing their understanding of the material, and multiple choice questions tend to be considered by them to be easier than short answer questions. It is also the case that there are many students in 1000 and 2000 level courses that are not going to go into that field after college, and are either taking it as an optional elective or as a requirement for the university. Questions that focus on the Scientific Practices or Cross-Cutting Concepts could then be viewed as unnecessary for those students, should they choose to not go into STEM at all. They might even drive people away from the field

if they feel they are being overwhelmed too early on in their university career. The addition of 3D-LAP focus would be more helpful in upper division courses, then, once students have had time to learn more about their chosen field and are more likely to enter into it after graduation.

In fact, a study looking more closely at upper level courses and at lab courses specifically focusing on scientific skills would be a worthwhile idea for a future study. Upper level courses would likely have fewer students, so the exams would be more likely to have short answer questions or questions beyond the Core concepts. Students at that point in their studies would also be more likely to be interested in assessing how prepared they are to enter into a research field. It would also be helpful to take test grades of students before beginning the study, change exam questions to better match the 3D-LAP standards, and then test the students again afterwards with the new questions - or compare the grades of students who take a 3D-LAP test to students that don't, similar to that as seen in Carmel, Ward, and Cooper's study in 2017. This could help add to the evidence supporting the 3D-LAP as a useful framework for helping students be prepared to join a science career. If more evidence were to come out of such studies, it would also provide a better incentive for teachers and professors to reevaluate their exam questions and ask where they could be improved. For any teachers that would consider doing that, there is worth to be found in reevaluating the questions for any improvement, even if they don't become "the perfect 3D-LAP question". So long as education continues to grow and change to better match the needs of students, this study and studies like it in the future can help improve scientific standards of exams in the future, as well as help provide students with the resources they need to become competent members of their chosen STEM field.

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Figures and Graphs

Figure 1.1

Code	Criterion (Scientific Practices)
AA	Developing and Using Models
AB	Planning Investigations
AC	Analyzing and Interpreting Data
AD	Using Mathematics and Computational Thinking
AE	Constructing Explanations and Engaging in Argument from Evidence
AF	Evaluating Information
AG	Visualizing Information

Code	Criterion (Core, Biology)
CA	Chemical and Physical Basis of Life
CB	Matter and Energy
CC	Cellular Basis of Life
CD	Systems
CE	Structure and Function
CF	Information Flow, Exchange, and Storage
CG	Evolution

Code	Criterion (Cross-Cutting Concepts)
BA	Patterns and Processes
BB	Cause and Effect: Mechanism and Explanation
BC	Scale, Proportion, and Quantity
BD	Systems and System Models
BE	Structure and Function
BF	Stability and Change

Code	Criterion (Core, Chemistry)
EA	Electrostatic and Bonding Interactions
EB	Atomic/Molecular Structure and Properties
EC	Energy
ED	Change and Stability in Chemical Systems

Code	Criterion (Core, Physics)
DA	Interactions Can Cause Changes in Motion
DB	Energy is Conserved
DC	Exchanges of Energy Increase Total Entropy
DD	Interactions are Mediated by Fields
DE	Energy, Momentum, Angular Momentum, and Information can be Transported without a Net Transfer of Matter

These tables contains the codes for reading the following graphs. The titles on the right side of each table are the criterion as defined by the 3D-LAP, with the exception of Visualizing Information (AG) which was added into the Scientific Practices criteria by the researchers.

Figure 1.2

Scientific Practice Criterion	Total Occurrences
AA	84
AB	8
AC	10
AD	115
AE	19
AF	3
AG	12

The above table shows the occurrences of each Scientific Practice criterion out of all 204 questions that met a criterion. There were 463 questions total. Note that the total adds to more than 204 due to some questions meeting more than one criterion.

Figure 1.3

Cross-Cutting Concept Criterion	Total Occurrences
BA	29
BB	42
BC	12
BD	16
BE	35
BF	2

The above table shows the occurrences of each Cross-Cutting Concept criterion for the 116 (out of 463) questions that met a Cross-Cutting Concept criterion.

Figure 1.4

Core Criterion (Biology)	Total Occurrences	Core Criterion (Chemistry)	Total Occurrences	Core Criterion (Physics	Total Occurrences
CA	29	EA	20	DA	49
CB	22	EB	39	DB	8
CC	23	EC	29	DC	1
CD	13	ED	27	DD	0
CE	46			DE	0
CF	96				
CG	10				

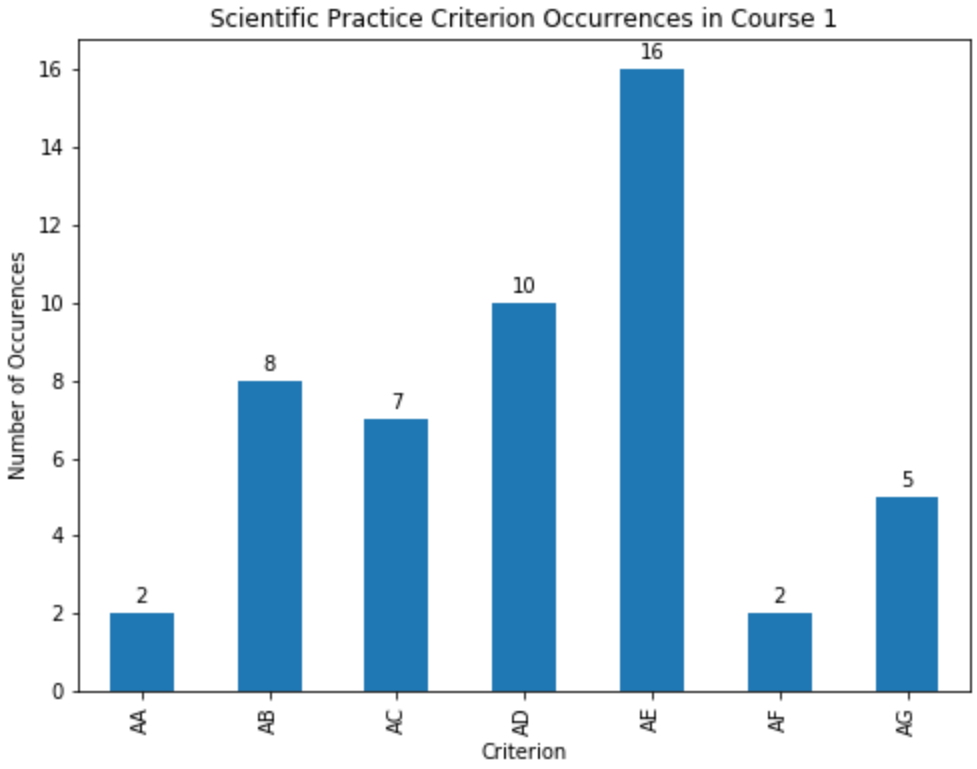
The above table shows all of the occurrences of the Core criteria. Some questions met more than one requirement, and so may account for more than one of the above numbers, including some questions from Course 3 which met both Biology and Chemistry criteria.

Figure 1.5

Course Number	Average Score
1	1.88
2	1.61
3	1.69
4	1.39
5	0.87
6	1.8

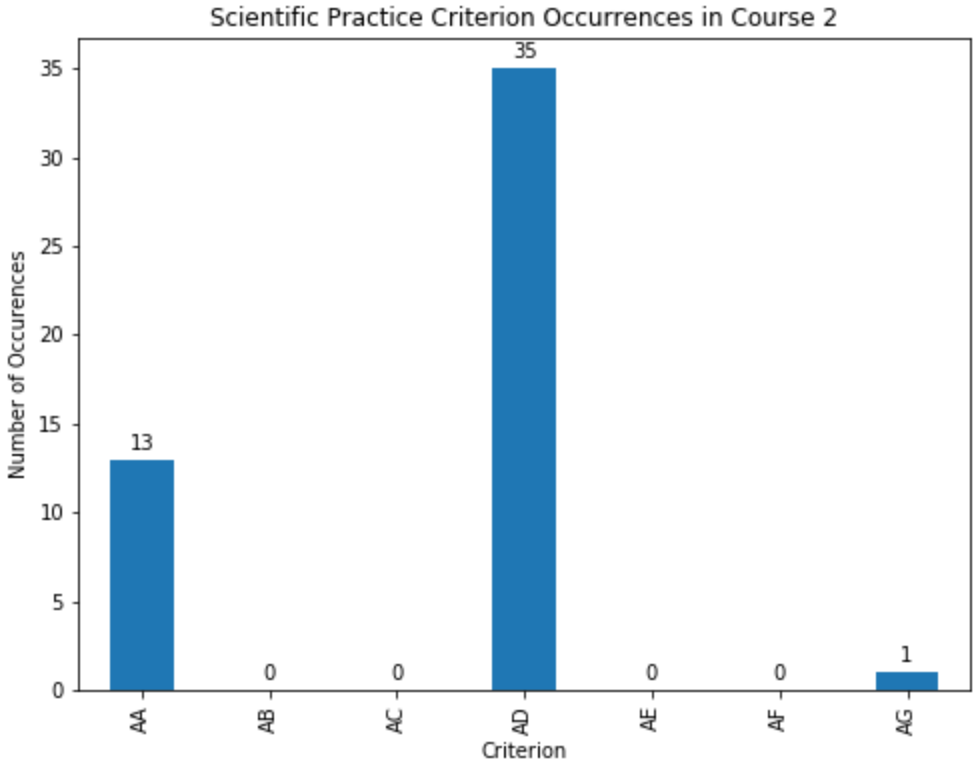
The table above shows the average scores for the questions in each of the courses. The scores for each question could range from 0 to 3, with 0 meaning that it met no criteria from any category, and 3 indicating that the question met at least one criteria from each category.

Figure 2.1



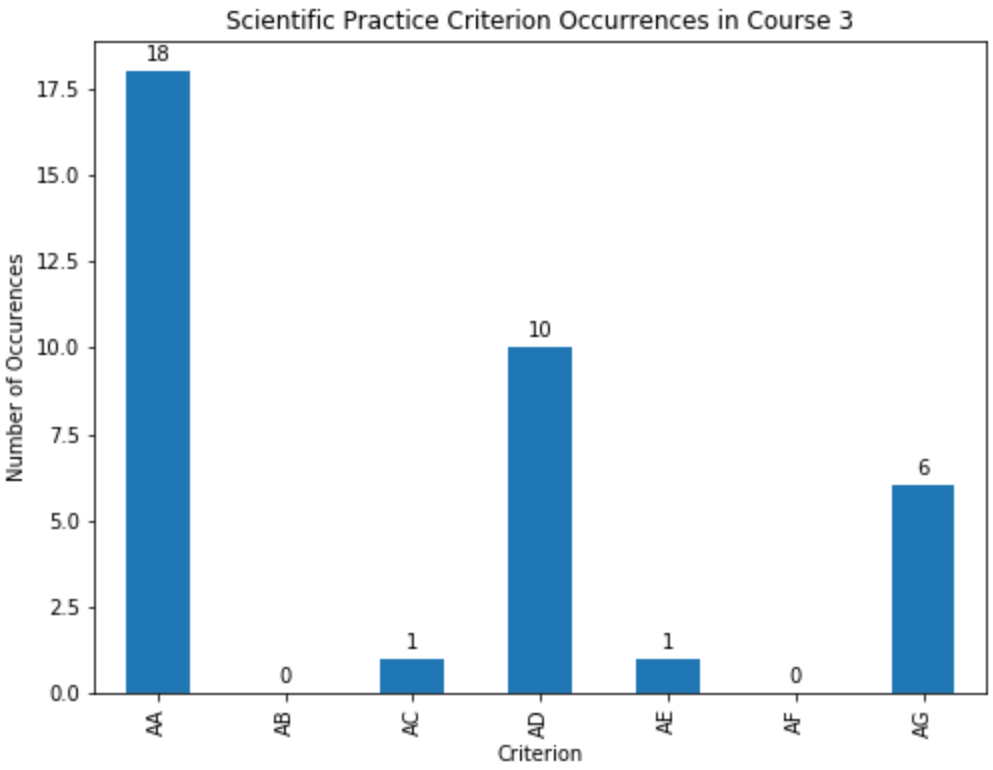
The number of occurrences of each scientific practice criterion in Course 1. Of 91 questions, 43 met a criterion.

Figure 2.2



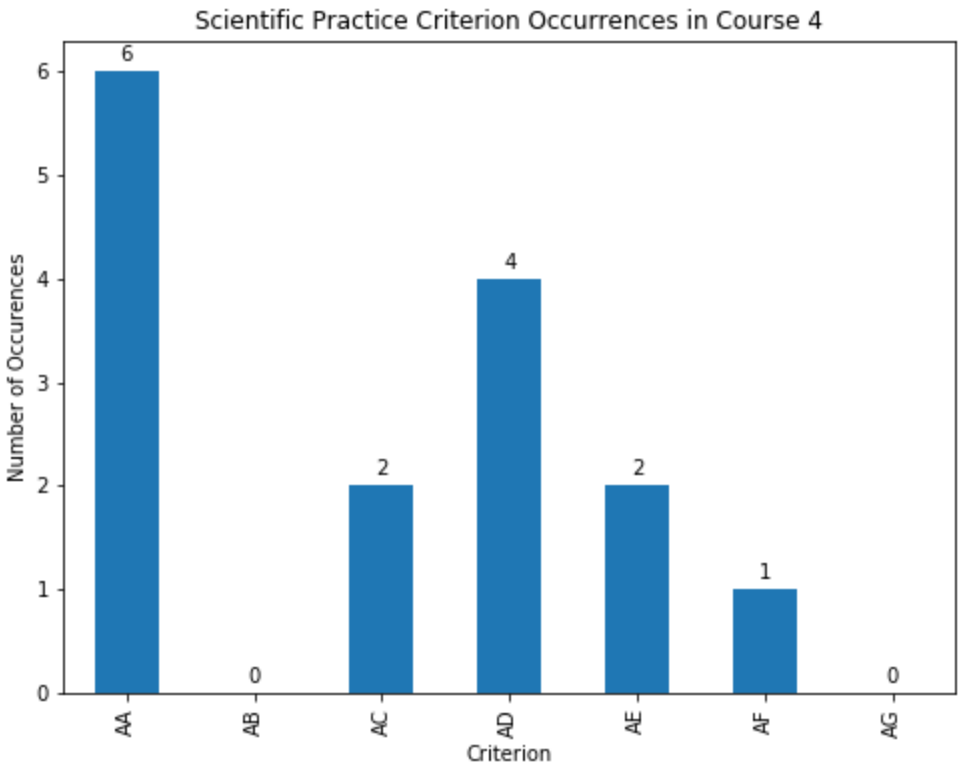
This graph depicts the number of SP occurrences for Course 2. There were 49 out of 75 questions that met a criterion.

Figure 2.3



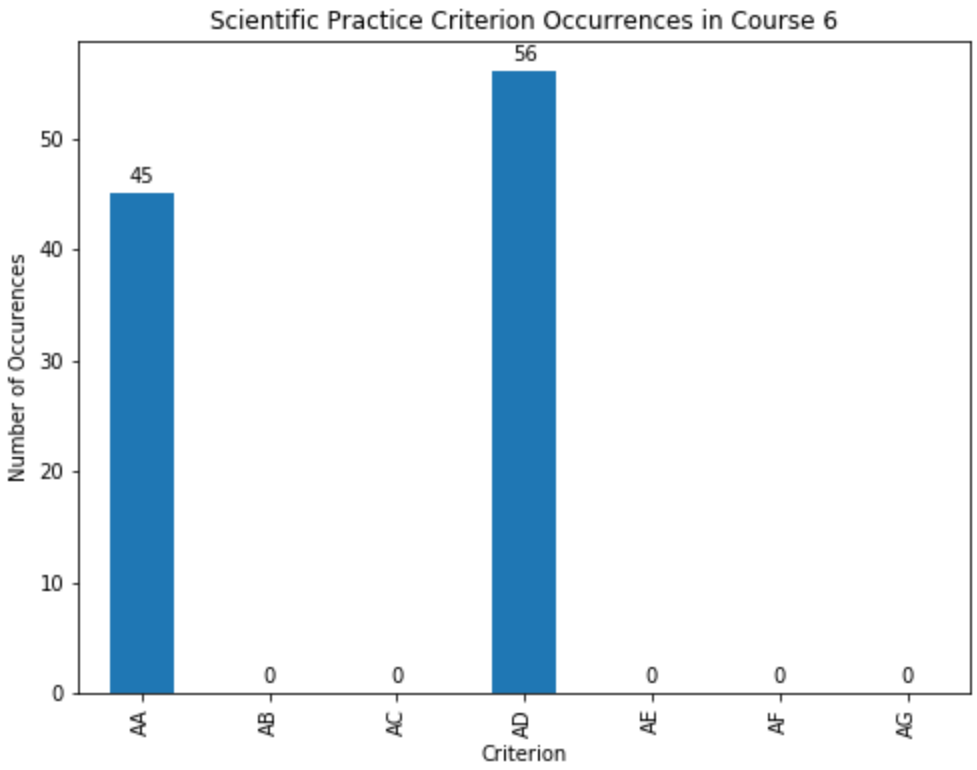
The above Scientific Practice occurrence data for Course 3 showed that of the 72 questions in Course 3, 29 met a criterion.

Figure 2.4



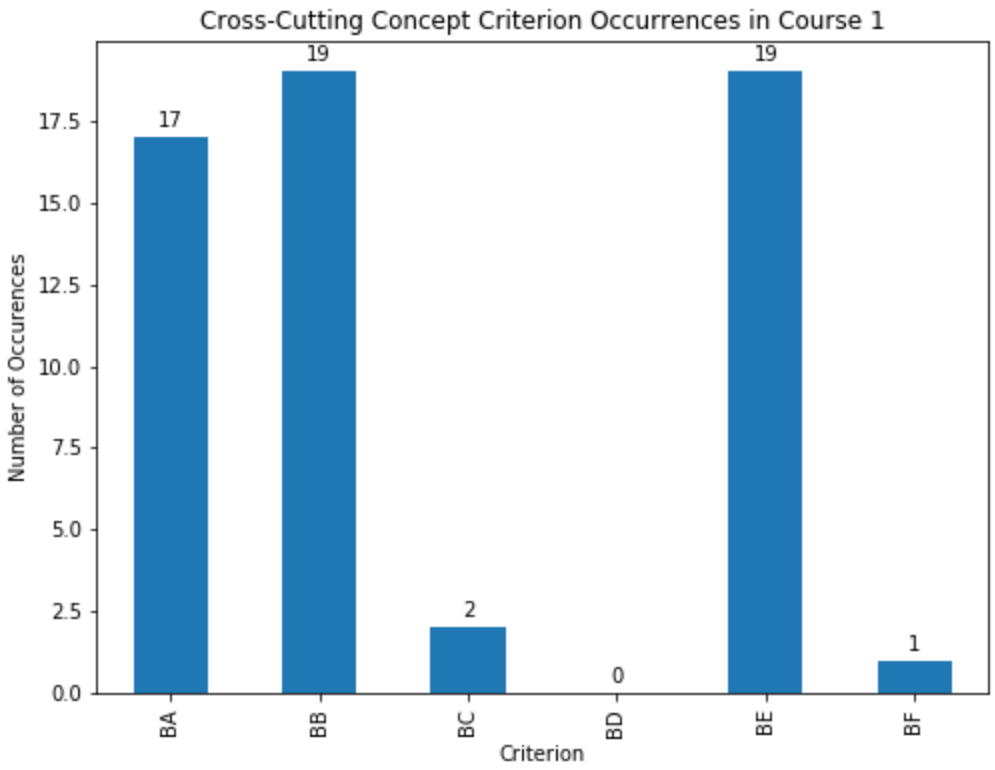
The graph depicts the Scientific Practice occurrence results for Course 4. There were 13 out of 90 questions that met a criteria.

Figure 2.5



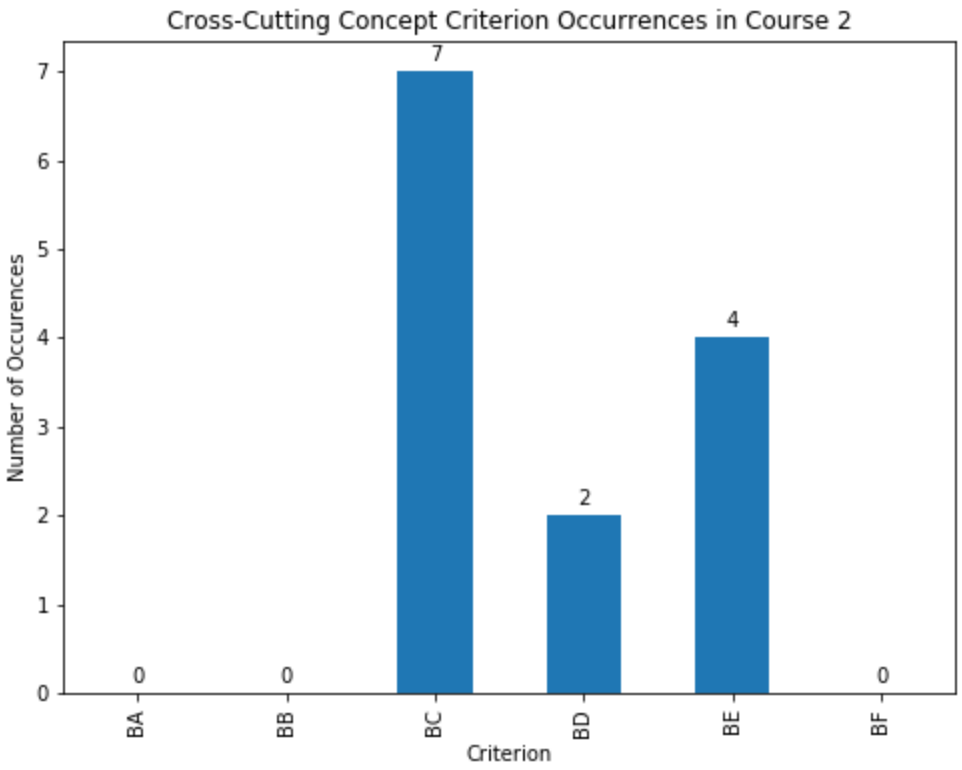
Shown above is Scientific Practice occurrences data for Course 6. There were 70 out of 75 questions that met a criteria.

Figure 3.1



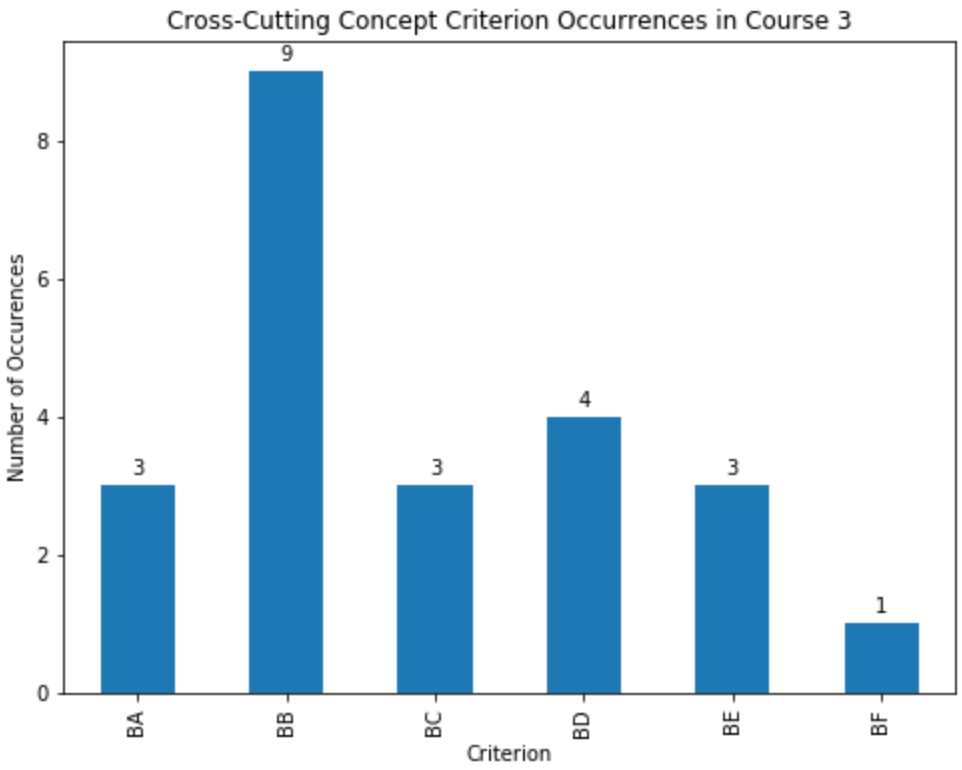
This figure shows the occurrences of each Cross-Cutting Concept Criterion in Course 1. There were 91 questions total, and 46 met a CC criterion.

Figure 3.2



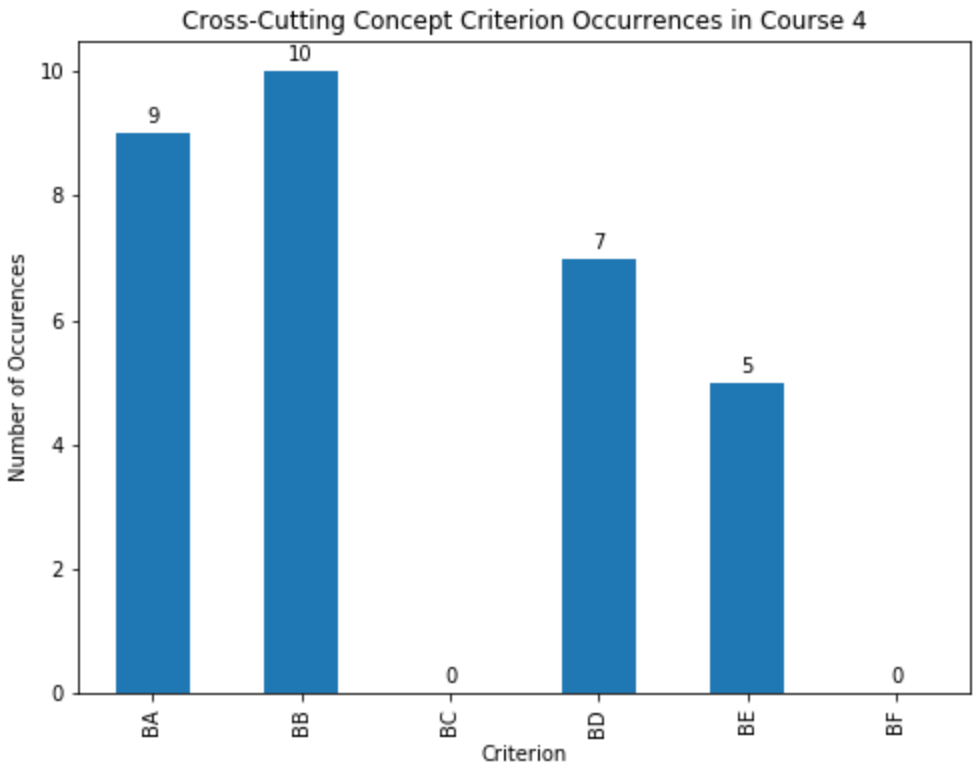
This figure shows the occurrences of each Cross-Cutting Concept Criterion in Course 2. There were 75 questions total, and 13 met a CC criterion.

Figure 3.3



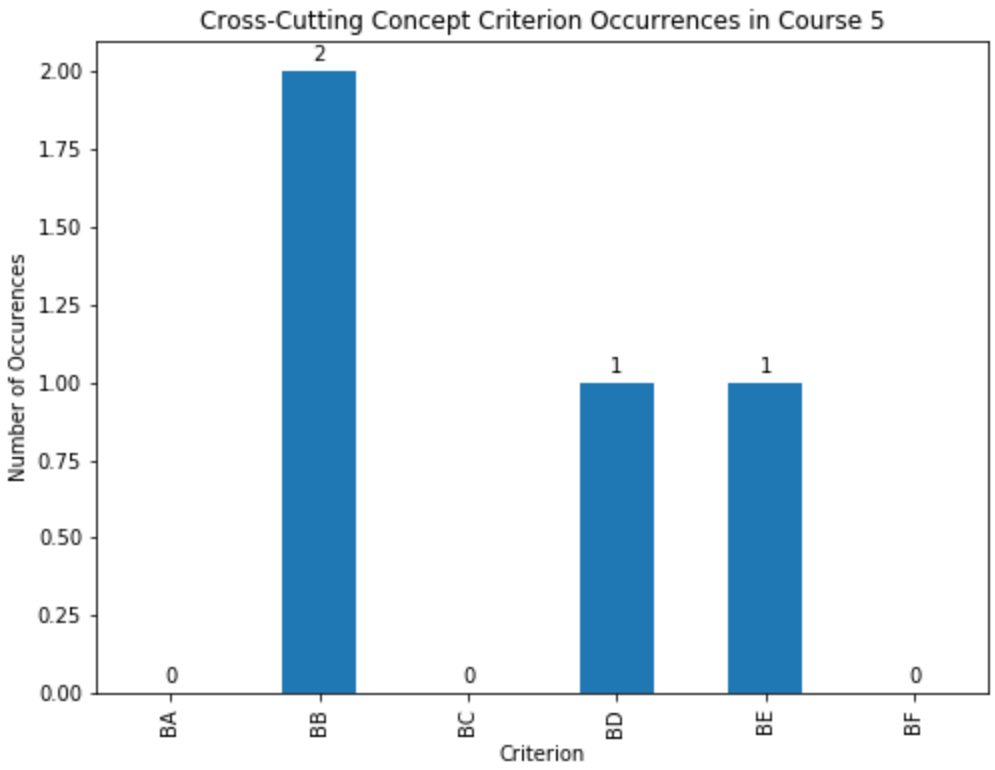
This figure shows the occurrences of each Cross-Cutting Concept Criterion in Course 3. There were 72 questions total, and 21 met a CC criterion.

Figure 3.4



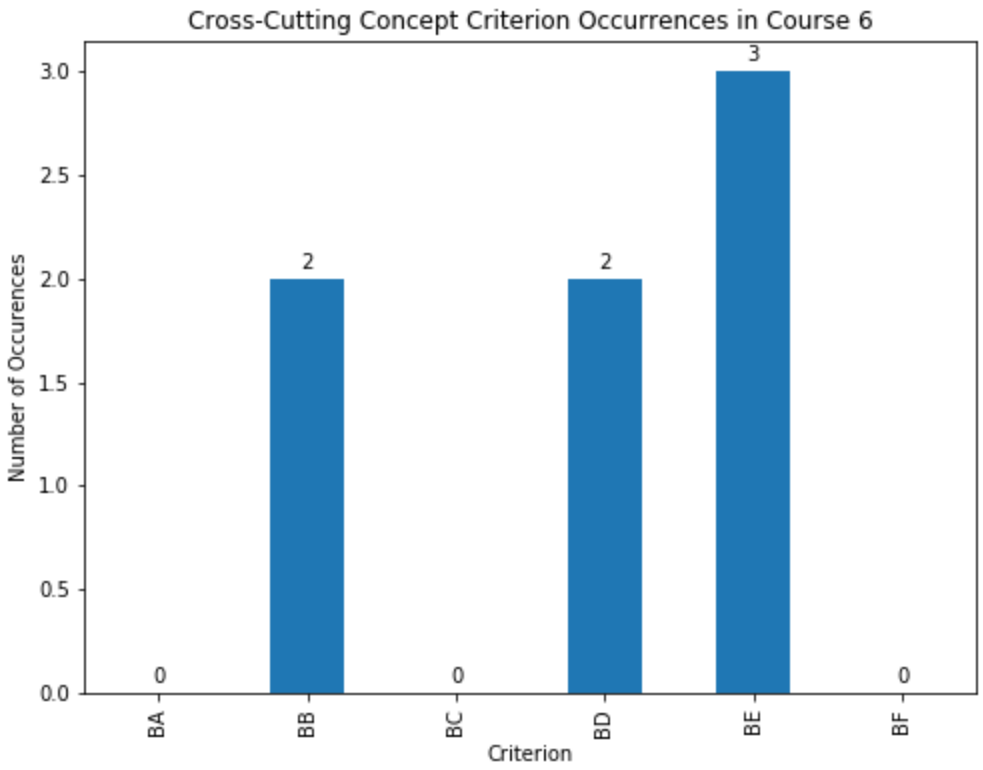
This figure shows the occurrences of each Cross-Cutting Concept Criterion in Course 1. There were 90 questions total, and 25 met a CC criterion.

Figure 3.5



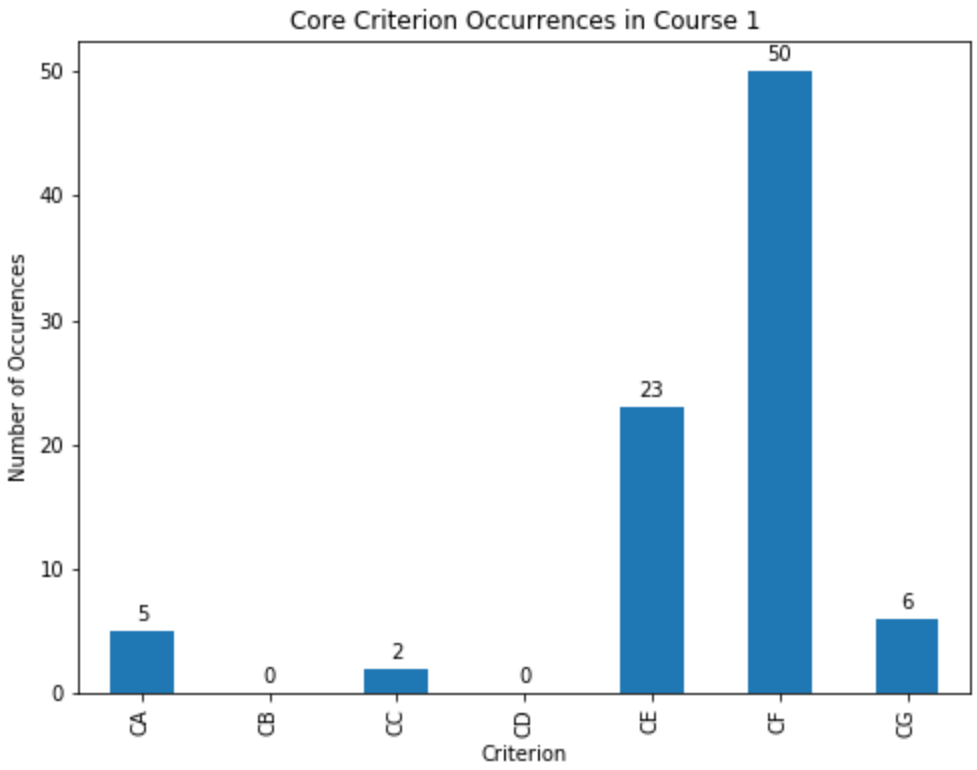
This figure shows the occurrences of each Cross-Cutting Concept Criterion in Course 5. There were 60 questions total, and 4 met a CC criterion.

Figure 3.6



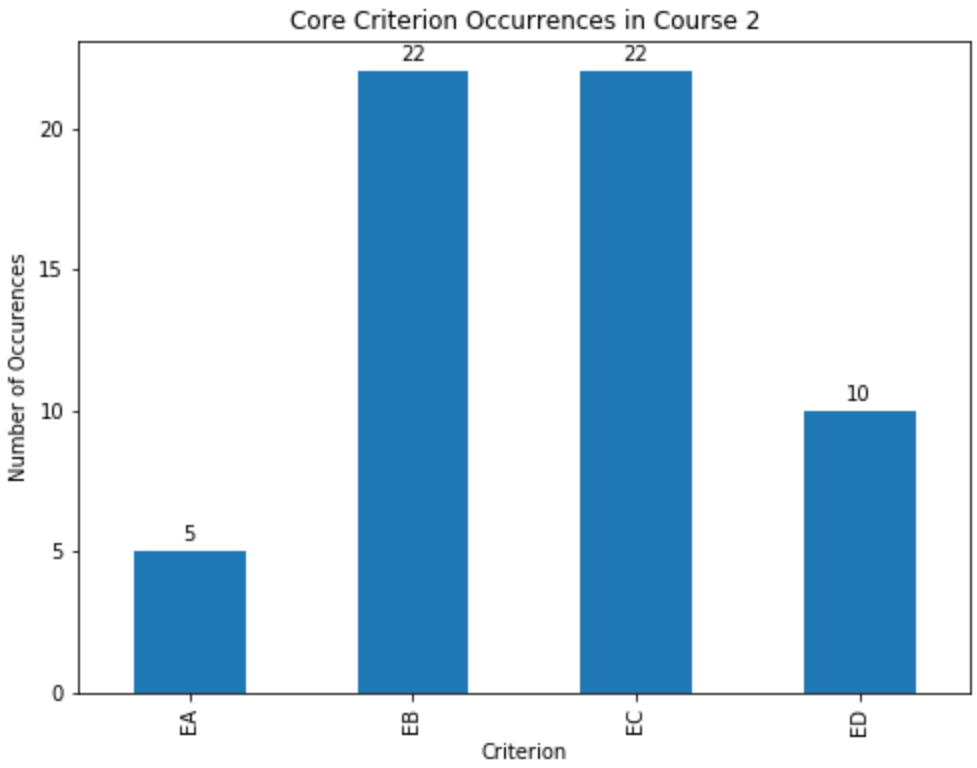
This figure shows the occurrences of each Cross-Cutting Concept Criterion in Course 6. There were 75 questions total, and 7 met a CC criterion.

Figure 4.1



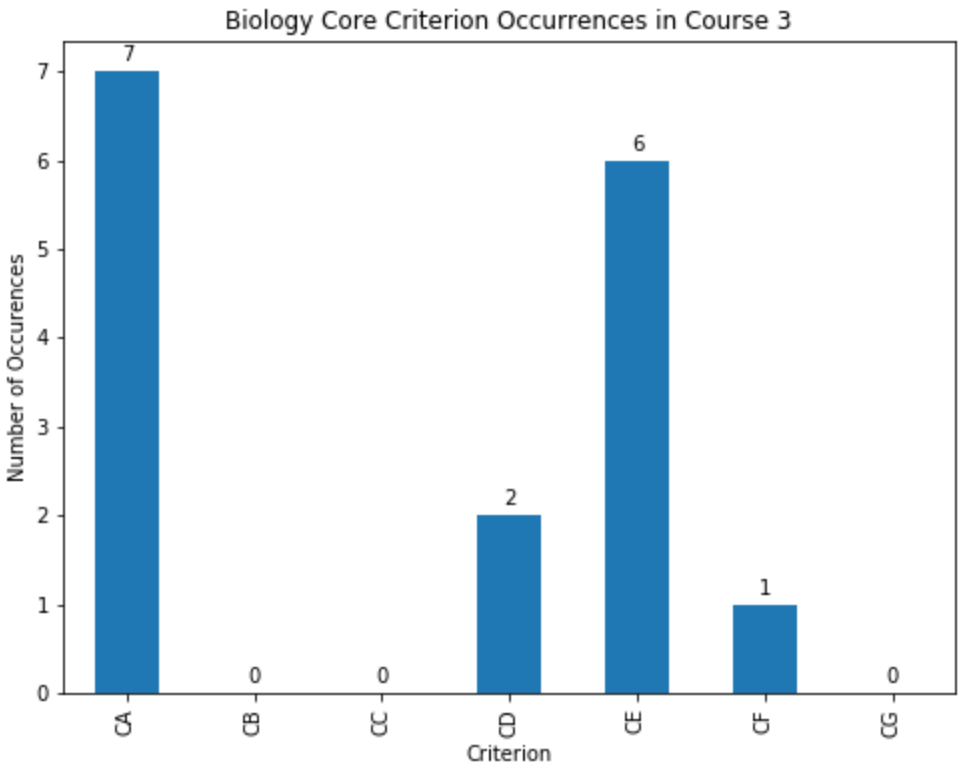
This graph displays the Core criterion occurrences for Course 1. There were 91 questions total, of which 82 met a criterion.

Figure 4.2



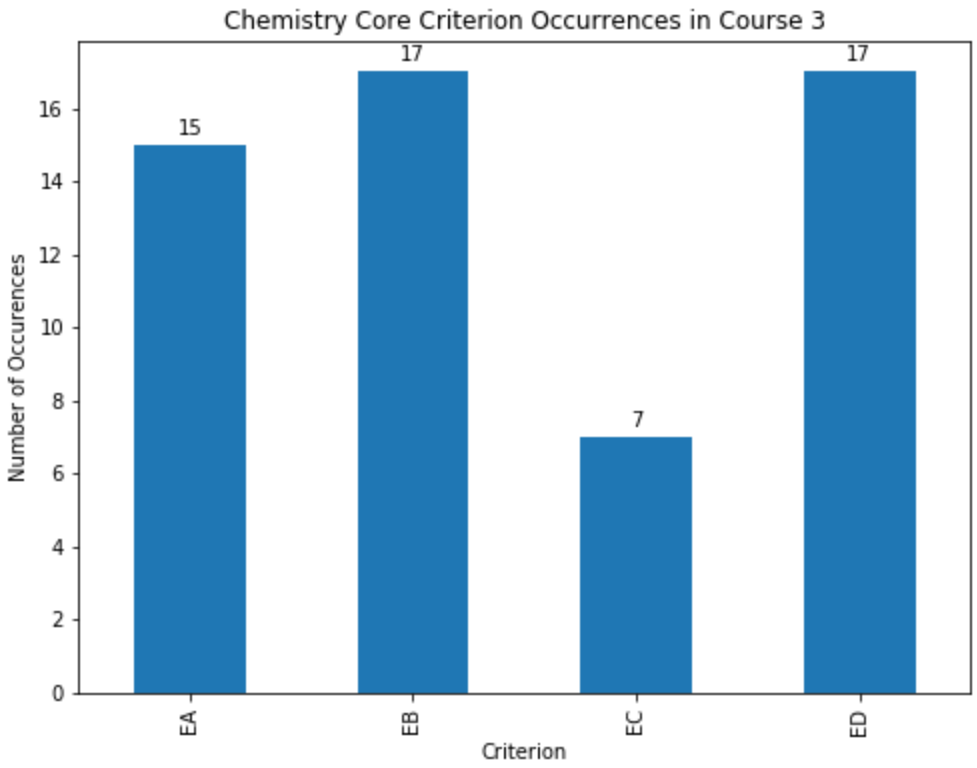
This graph displays the Core criterion occurrences for Course 2. There were 75 questions total, of which 59 met a criterion.

Figure 4.3



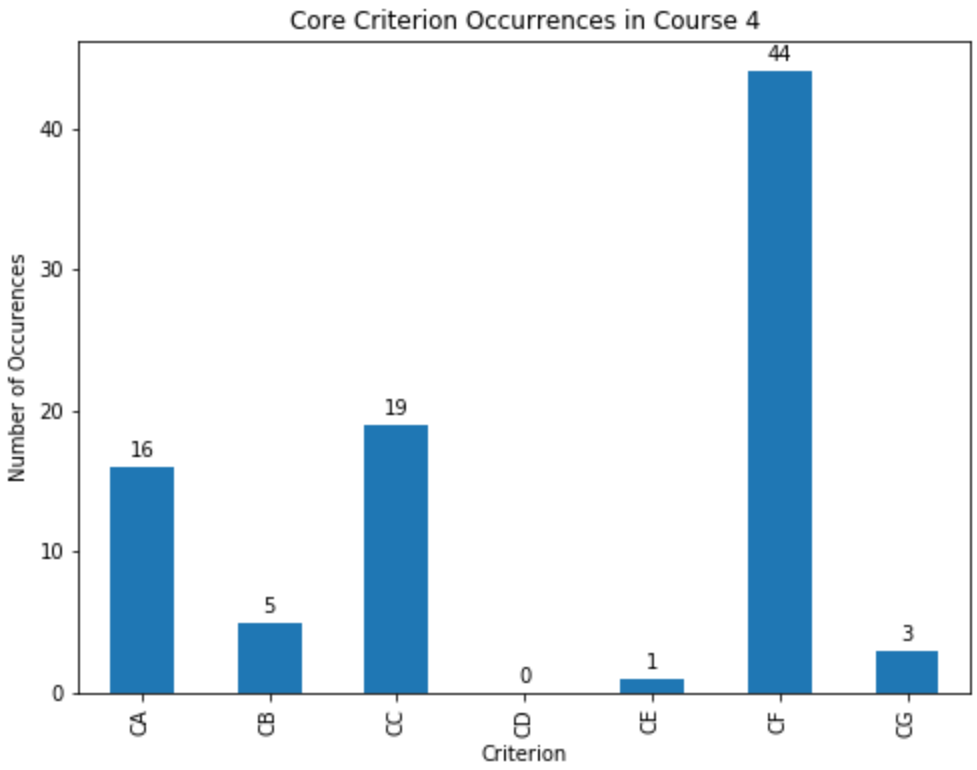
This graph displays the Biology Core criterion occurrences for Course 3. Of 72 total questions, 16 met a biology criterion.

Figure 4.4



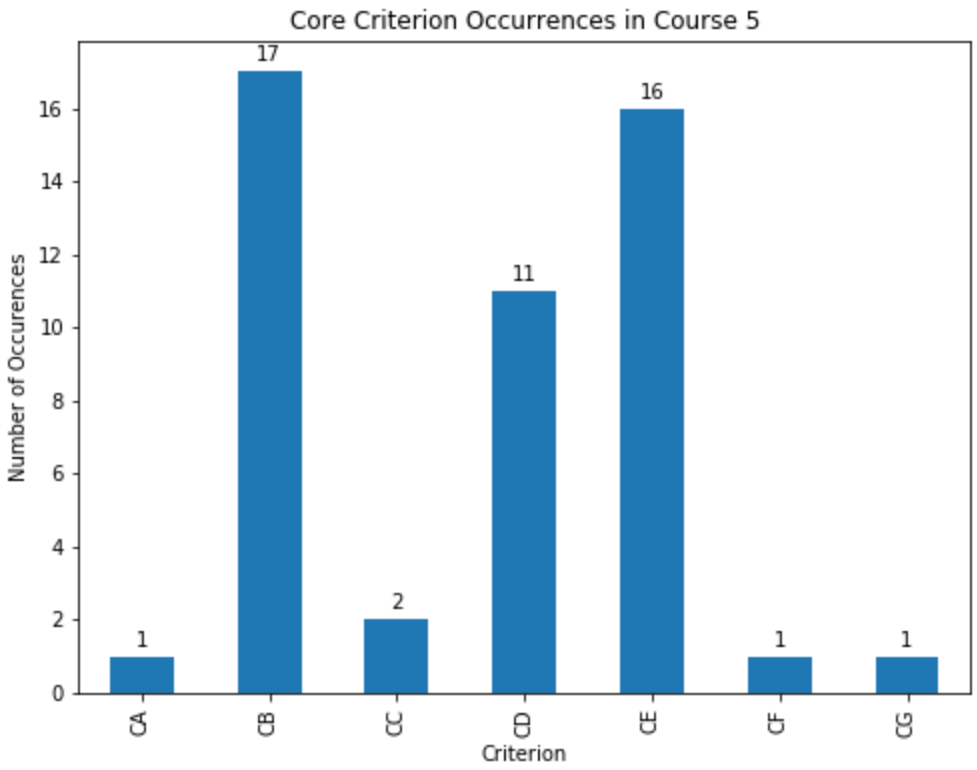
This graph displays the Chemistry Core criterion occurrences for Course 3. There were 72 questions total, and 55 met a chemistry criterion. Of all 72 questions, all 72 met some sort of core criterion.

Figure 4.5



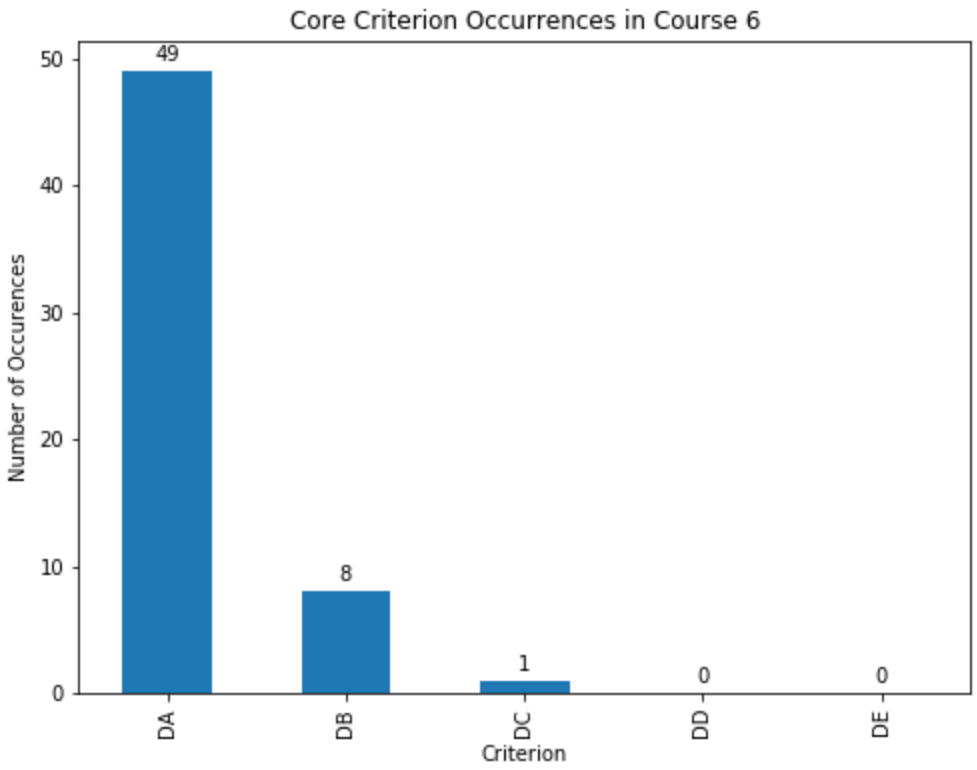
This graph displays the Core criterion occurrences for Course 4. There were 90 questions total, of which 87 met a criterion.

Figure 4.6



This graph displays the Core criterion occurrences for Course 5. There were 60 questions total, of which 48 met a criterion.

Figure 4.7



This graph displays the Core criterion occurrences for Course 6. There were 75 questions total, of which 58 met a criterion.

Appendices

Appendix A

8. (8 points total; 4 points each). A diploid zebrafish is produced by suppressing meiosis II in an egg, so that the sister chromatids divide but stay in the same cell.

a) Is the resulting individual genetically identical to the female that produced the egg? Why or why not?

b) Is the resulting individual expected to be homozygous for all of its genes? Why or why not?

The above question is an example of a question that meets all three standards of the 3D-LAP. It meets the AE criterion of Scientific Practices by asking the students to understand and justify their answers. It satisfies the BB criterion of Cross-Cutting Concepts by asking the students to consider what the effects of suppressing meiosis would be on a resulting individual. This question also meets the CF criterion of Core, which has to do with understanding how information (such as DNA) moves through and between individuals, including understanding the products of meiosis.

Appendix B

The following code is for calculating the number of occurrences of each criterion in a course and printing that information as a bar graph, as well as finding the average score for questions in that course.

```
import matplotlib.pyplot as plt
import pandas as pd


# function that will turn a file into a list for easier
access
def turn_file_into_list(filename):
    infile=open(filename, 'r')
    the_list=[]
    for line in infile:
        the_line=line.split(",")
        the_list.append(the_line)
    infile.close()
    return the_list



# function that plots information from a list
def get_a_plot(label_list,amount_list,title):
    frequencies = amount_list
    freq_series = pd.Series.from_array(frequencies)

    x_labels = label_list
    plt.figure(figsize=(8, 6))
    ax = freq_series.plot(kind='bar')
    ax.set_title(title)
    ax.set_xlabel('Criterion')
    ax.set_ylabel('Number of Occurences')
    ax.set_xticklabels(x_labels)

    rects = ax.patches
    for rect in rects:
        y_value = rect.get_height()
        x_value = rect.get_x() + rect.get_width() / 2
        space = 3
        va = 'bottom'
        if y_value < 0:
            space *= -1
            va = 'top'
        label = format(y_value)
        #"{:.1f}".
        plt.annotate(
            label,
            (x_value, y_value),
            xytext=(0, space),
            textcoords="offset points",
            ha='center',
            va=va)
    plt.savefig(title+".png")


# function for counting SP scores in a list
def SP_scores(file_list):
    AA=0
    AB=0
    AC=0
    AD=0
    AE=0
    AF=0
    AG=0
    n=0
    for i in range(1,len(file_list),3):
        if file_list[i][6] == "1":
            n+=1
            if file_list[i][7] == "AA":
                AA+=1
            elif file_list[i][7] == "AB":
                AB+=1
            elif file_list[i][7] == "AC":
                AC+=1
            elif file_list[i][7] == "AD":
                AD+=1
            elif file_list[i][7] == "AE":
                AE+=1
            elif file_list[i][7] == "AF":
                AF+=1
            elif file_list[i][7] == "AG":
                AG+=1
            else:
                AA+=0
        # add the \n to the end of these since they are
        # at the end of lines in the file
        if file_list[i][6] == "1":
            if file_list[i][8] == "AA\n":
                AA+=1
            elif file_list[i][8] == "AB\n":
                AB+=1
            elif file_list[i][8] == "AC\n":
                AC+=1
            elif file_list[i][8] == "AD\n":
                AD+=1
            elif file_list[i][8] == "AE\n":
                AE+=1
```

```
        elif file_list[i][8] == "AF\n":
            AF+=1
        elif file_list[i][8] == "AG\n":
            AG+=1
        else:
            AA+=0
    print("AA: "+str(AA))
    print("AB: "+str(AB))
    print("AC: "+str(AC))
    print("AD: "+str(AD))
    print("AE: "+str(AE))
    print("AF: "+str(AF))
    print("AG: "+str(AG))
    print("There were " + str(n) + " questions that met
a criteria.")
    answer=input("Plot? ")
    if answer == "y":
        objects = ['AA', 'AB', 'AC','AD', 'AE', 'AF', 'AG']
        amounts = [AA, AB, AC, AD, AE, AF, AG]
        course=input("What course? ")
        title="Scientific Practice Criterion Occurrences
in " + course
        get_a_plot(objects,amounts,title)

# function for counting number of CC scores in a
file
def CC_scores(file_list):
    BA=0
    BB=0
    BC=0
    BD=0
    BE=0
    BF=0
    n=0
    for i in range(3,len(file_list),3):
        if file_list[i][6] == "1":
            n+=1
            if file_list[i][7] == "BA":
                BA+=1
            elif file_list[i][7] == "BB":
                BB+=1
            elif file_list[i][7] == "BC":
                BC+=1
            elif file_list[i][7] == "BD":
                BD+=1
            elif file_list[i][7] == "BE":
                BE+=1
            elif file_list[i][7] == "BF":
                BF+=1
            else:
                BA+=1
        if file_list[i][6] == "1":
            if file_list[i][8] == "BA\n":
                BA+=1
            elif file_list[i][8] == "BB\n":
                BB+=1
            elif file_list[i][8] == "BC\n":
                BC+=1
            elif file_list[i][8] == "BD\n":
                BD+=1
            elif file_list[i][8] == "BE\n":
                BE+=1
            elif file_list[i][8] == "BF\n":
                BF+=1
            else:
                BA+=0
    print("BA: "+str(BA))
    print("BB: "+str(BB))
    print("BC: "+str(BC))
    print("BD: "+str(BD))
    print("BE: "+str(BE))
    print("BF: "+str(BF))
    print("There were " + str(n) + " questions that met
a criteria.")
    answer=input("Plot? ")
    if answer == "y":
        objects = ['BA', 'BB', 'BC','BD', 'BE', 'BF']
        amounts = [BA, BB, BC, BD, BE, BF]
        course=input("What course? ")
        title="Cross-Cutting Concept Criterion
Occurrences in " + course
        get_a_plot(objects,amounts,title)

# function for counting the bio core criteria
def BIO_Core(file_list):
    CA=0
    CB=0
    CC=0
    CD=0
    CE=0
    CF=0
    CG=0
    n=0
    for i in range(2,len(file_list),3):
        if file_list[i][6] == "1":
            n+=1
            if file_list[i][7] == "CA":
                CA+=1
            elif file_list[i][7] == "CB":
                CB+=1
```

```
        elif file_list[i][7] == "CC":
            CC+=1
        elif file_list[i][7] == "CD":
            CD+=1
        elif file_list[i][7] == "CE":
            CE+=1
        elif file_list[i][7] == "CF":
            CF+=1
        elif file_list[i][7] == "CG":
            CG+=1
        else:
            CG+=0
    for i in range(2,len(file_list),3):
        if file_list[i][6] == "1":
            if file_list[i][8] == "CA\n":
                CA+=1
            elif file_list[i][8] == "CB\n":
                CB+=1
            elif file_list[i][8] == "CC\n":
                CC+=1
            elif file_list[i][8] == "CD\n":
                CD+=1
            elif file_list[i][8] == "CE\n":
                CE+=1
            elif file_list[i][8] == "CF\n":
                CF+=1
            elif file_list[i][8] == "CG\n":
                CG+=1
            else:
                CA+=0
    print("CA: "+str(CA))
    print("CB: "+str(CB))
    print("CC: "+str(CC))
    print("CD: "+str(CD))
    print("CE: "+str(CE))
    print("CF: "+str(CF))
    print("CG: "+str(CG))
    print("There were " + str(n) + " questions that met
a criteria.")
    answer=input("Plot? ")
    if answer == "y":
        objects = ['CA', 'CB', 'CC','CD', 'CE', 'CF', 'CG']
        amounts = [CA,CB,CC,CD,CE,CF,CG]
        course=input("What course? ")
        # need to change the title for Course 3
        title="Core Criterion Occurrences in " + course
        get_a_plot(objects,amounts,title)

# function for getting chemistry core criteria counts
def CHEM_Core(file_list):
    EA=0
    EB=0
    EC=0
    ED=0
    n=0
    for i in range(2,len(file_list),3):
        if file_list[i][6] == "1":
            n+=1
            if file_list[i][7] == "EA":
                EA+=1
            elif file_list[i][7] == "EB":
                EB+=1
            elif file_list[i][7] == "EC":
                EC+=1
            elif file_list[i][7] == "ED":
                ED+=1
            else:
                ED+=0
        if file_list[i][6] == "1":
            if file_list[i][8] == "EA\n":
                EA+=1
            elif file_list[i][8] == "EB\n":
                EB+=1
            elif file_list[i][8] == "EC\n":
                EC+=1
            elif file_list[i][8] == "ED\n":
                ED+=1
            else:
                EA+=0
    print("EA: "+str(EA))
    print("EB: "+str(EB))
    print("EC: "+str(EC))
    print("ED: "+str(ED))
    print("There were " + str(n) + " questions that met
a criteria.")
    answer=input("Plot? ")
    if answer == "y":
        objects = ['EA', 'EB', 'EC','ED']
        amounts = [EA,EB,EC,ED]
        course=input("What course? ")
        # need to change title for Course 3
        title="Core Criterion Occurrences in " + course
        get_a_plot(objects,amounts,title)

# function for getting phys core counts
def PHYS_Core(file_list):
    DA=0
    DB=0
    DC=0
    DD=0
```

```
    DE=0
    n=0
    for i in range(2,len(file_list),3):
        if file_list[i][6] == "1":
            n+=1
            if file_list[i][7] == "DA":
                DA+=1
            elif file_list[i][7] == "DB":
                DB+=1
            elif file_list[i][7] == "DC":
                DC+=1
            elif file_list[i][7] == "DD":
                DD+=1
            elif file_list[i][7] == "DE":
                DE+=1
            else:
                DA+=0
        if file_list[i][6] == "1":
            if file_list[i][8] == "DA\n":
                DA+=1
            elif file_list[i][8] == "DB\n":
                DB+=1
            elif file_list[i][8] == "DC\n":
                DC+=1
            elif file_list[i][8] == "DD\n":
                DD+=1
            elif file_list[i][8] == "DE\n":
                DE+=1
            else:
                DA+=0
    print("DA: "+str(DA))
    print("DB: "+str(DB))
    print("DC: "+str(DC))
    print("DD: "+str(DD))
    print("DE: "+str(DE))
    print("There were " + str(n) + " questions that met
a criteria.")
    answer=input("Plot? ")
    if answer == "y":
        objects = ['DA', 'DB', 'DC','DD', 'DE']
        amounts = [DA,DB,DC,DD,DE]
        course=input("What course? ")
        title="Core Criterion Occurrences in " + course
        get_a_plot(objects,amounts,title)

# this function will give the total number of
questions and the average
# score of questions for that course
def find_av(file_list):
    total=0
    q_num=0
    for i in range(1,len(file_list)):
        total+=int(file_list[i][6])
        q_num+=1
    q_num=q_num//3
    aver=total/q_num
    aver=round(aver,2)
    print(total)
    print("total questions: " + str(q_num))
    print(aver)

def main():
    filename = input("FILE: ")
    file_list=turn_file_into_list(filename)
    #print(file_list)
    SP_scores(file_list)
    CC_scores(file_list)
    field=input("bio, chem, or phys? ")
    while field != "bio" and field != "chem" and field
!= "phys":
        field=input("bio, chem, or phys? ")
    if field == "bio":
        BIO_Core(file_list)
    elif field == "chem":
        CHEM_Core(file_list)
    else:
        PHYS_Core(file_list)
    find_av(file_list)



if __name__=="__main__":
    main()
```

Appendix C

The following code was for finding the overall occurrences of each criterion between all courses, for each standard as well as each criterion within the standard.

```
# converts file into a list for easier access
def files_to_lists(filename):
    infile=open(filename, 'r')
    the_list=[]
    for line in infile:
        the_line=line.split(",")
        the_list.append(the_line)
    infile.close()
    return the_list

# gets scientific practice scores
def SP_scores(file_list):
    AA=0
    AB=0
    AC=0
    AD=0
    AE=0
    AF=0
    AG=0
    n=0
    a=0
    for i in range(1,len(file_list),3):
        a+=1
        if file_list[i][6] == "1":
            n+=1
            if file_list[i][7] == "AA":
                AA+=1
            elif file_list[i][7] == "AB":
                AB+=1
            elif file_list[i][7] == "AC":
                AC+=1
            elif file_list[i][7] == "AD":
                AD+=1
            elif file_list[i][7] == "AE":
                AE+=1
            elif file_list[i][7] == "AF":
                AF+=1
            elif file_list[i][7] == "AG":
                AG+=1
            else:
                AA+=0
        # add \n to these since they were at the end
        # of the lines in the file
        if file_list[i][6] == "1":
            if file_list[i][8] == "AA\n":
                AA+=1
            elif file_list[i][8] == "AB\n":
                AB+=1
            elif file_list[i][8] == "AC\n":
                AC+=1
            elif file_list[i][8] == "AD\n":
                AD+=1
            elif file_list[i][8] == "AE\n":
                AE+=1
            elif file_list[i][8] == "AF\n":
                AF+=1
            elif file_list[i][8] == "AG\n":
                AG+=1
            else:
                AA+=0
    new_list=[AA,AB,AC,AD,AE,AF,AG,n,a]
    return new_list

# gets cross-cutting concept scores
def CC_scores(file_list):
    BA=0
    BB=0
    BC=0
    BD=0
    BE=0
    BF=0
    n=0
    a=0
    for i in range(3,len(file_list),3):
        a+=1
        if file_list[i][6] == "1":
            n+=1
            if file_list[i][7] == "BA":
                BA+=1
            elif file_list[i][7] == "BB":
                BB+=1
            elif file_list[i][7] == "BC":
                BC+=1
            elif file_list[i][7] == "BD":
                BD+=1
            elif file_list[i][7] == "BE":
                BE+=1
            elif file_list[i][7] == "BF":
                BF+=1
            else:
                BA+=1
        if file_list[i][6] == "1":
```

```
        if file_list[i][8] == "BA\n":
          BA+=1
        elif file_list[i][8] == "BB\n":
          BB+=1
        elif file_list[i][8] == "BC\n":
          BC+=1
        elif file_list[i][8] == "BD\n":
          BD+=1
        elif file_list[i][8] == "BE\n":
          BE+=1
        elif file_list[i][8] == "BF\n":
          BF+=1
        else:
          BA+=0
    new_list=[BA,BB,BC,BD,BE,BF,n,a]
    return new_list

# get bio core counts
def BIO_Core(file_list):
    CA=0
    CB=0
    CC=0
    CD=0
    CE=0
    CF=0
    CG=0
    n=0
    a=0
    for i in range(2,len(file_list),3):
      a+=1
      if file_list[i][6] == "1":
        n+=1
        if file_list[i][7] == "CA":
          CA+=1
        elif file_list[i][7] == "CB":
          CB+=1
        elif file_list[i][7] == "CC":
          CC+=1
        elif file_list[i][7] == "CD":
          CD+=1
        elif file_list[i][7] == "CE":
          CE+=1
        elif file_list[i][7] == "CF":
          CF+=1
        elif file_list[i][7] == "CG":
          CG+=1
        else:
          CG+=0
      if file_list[i][6] == "1":
        if file_list[i][8] == "CA\n":
          CA+=1
        elif file_list[i][8] == "CB\n":
          CB+=1
        elif file_list[i][8] == "CC\n":
          CC+=1
        elif file_list[i][8] == "CD\n":
          CD+=1
        elif file_list[i][8] == "CE\n":
          CE+=1
        elif file_list[i][8] == "CF\n":
          CF+=1
        elif file_list[i][8] == "CG\n":
          CG+=1
        else:
          CA+=0
    new_list=[CA,CB,CC,CD,CE,CF,CG,n,a]
    return new_list

# get chem core counts
def CHEM_Core(file_list):
    EA=0
    EB=0
    EC=0
    ED=0
    n=0
    a=0
    for i in range(2,len(file_list),3):
      a+=1
      if file_list[i][6] == "1":
        n+=1
        if file_list[i][7] == "EA":
          EA+=1
        elif file_list[i][7] == "EB":
          EB+=1
        elif file_list[i][7] == "EC":
          EC+=1
        elif file_list[i][7] == "ED":
          ED+=1
        else:
          ED+=0
      if file_list[i][6] == "1":
        if file_list[i][8] == "EA\n":
          EA+=1
        elif file_list[i][8] == "EB\n":
          EB+=1
        elif file_list[i][8] == "EC\n":
          EC+=1
        elif file_list[i][8] == "ED\n":
          ED+=1
        else:
```

```
            EA+=0
    new_list=[EA,EB,EC,ED,n,a]
    return new_list

# get phys core counts
def PHYS_Core(file_list):
    DA=0
    DB=0
    DC=0
    DD=0
    DE=0
    n=0
    a=0
    for i in range(2,len(file_list),3):
        a+=1
        if file_list[i][6] == "1":
            n+=1
            if file_list[i][7] == "DA":
                DA+=1
            elif file_list[i][7] == "DB":
                DB+=1
            elif file_list[i][7] == "DC":
                DC+=1
            elif file_list[i][7] == "DD":
                DD+=1
            elif file_list[i][7] == "DE":
                DE+=1
            else:
                DA+=0
        if file_list[i][6] == "1":
            if file_list[i][8] == "DA\n":
                DA+=1
            elif file_list[i][8] == "DB\n":
                DB+=1
            elif file_list[i][8] == "DC\n":
                DC+=1
            elif file_list[i][8] == "DD\n":
                DD+=1
            elif file_list[i][8] == "DE\n":
                DE+=1
            else:
                DA+=0
    new_list=[DA,DB,DC,DD,DE,n,a]
    return new_list

# function for combining SP scores and CC scores
to manipulate
# them at the same time
def get_array(file_list):
    list_sp=SP_scores(file_list)
    list_cc=CC_scores(file_list)
    arr=[list_sp,list_cc]
    return arr

# sums up the SP scores from each course and
returns as a list
def get_SPsums(list_name):
    sp_list=[]
    for i in range(9):
        sp_list.append(list_name[0][0][i])
    for j in range(1,len(list_name)):
        for k in range(9):
            sp_list[k]=sp_list[k]+list_name[j][0][k]
    return sp_list

# sums up CC scores from each course and returns
as a list
def get_CCsums(list_name):
    sp_list=[]
    for i in range(8):
        sp_list.append(list_name[0][1][i])
    for j in range(1,len(list_name)):
        for k in range(8):
            sp_list[k]=sp_list[k]+list_name[j][1][k]
    return sp_list

# uses the list from get_SPsums and prints it so that
# each criterion is labelled
def print_SP_nums(list_name):
    SPl=list_name
    print("AA: "+str(SPl[0])+ "  AB: "+str(SPl[1])+ "
AC: "+
          str(SPl[2])+ "  AD: "+str(SPl[3])+ "  AE:
"+str(SPl[4])+ "  AF: "+
          str(SPl[5])+"  AG: " + str(SPl[6]))
    print("Questions that met a criterion:
"+str(SPl[7]))
    print("Total questions: "+ str(SPl[8]))

# uses the list from get_CCsums and prints it so that
# each criterion is labelled
def print_CC_nums(list_name):
    SPl=list_name
    print("BA: "+str(SPl[0])+ "  BB: "+str(SPl[1])+ "
BC: "+
          str(SPl[2])+ "  BD: "+str(SPl[3])+ "  BE:
"+str(SPl[4])+ "  BF: "+
          str(SPl[5]))
    print("Questions that met a criterion:
"+str(SPl[6]))
```

```
    print("Total questions: "+ str(SPl[7]))

# gets the sums for each core criteria and returns as
a list
def get_more_sums(list_name):
    sp_list=[]
    for i in range(len(list_name[0])):
        sp_list.append(list_name[0][i])
    for j in range(1,len(list_name)):
        for k in range(len(list_name[0])):
            sp_list[k]=sp_list[k]+list_name[j][k]
    return sp_list

# bio, chem, and phys printing functions are
separated as each
# criterion label is different
def print_BIO_nums(list_name):
    SPl=list_name
    print("CA: "+str(SPl[0])+ "  CB: "+str(SPl[1])+ "
CC: "+
        str(SPl[2])+ "  CD: "+str(SPl[3])+ "  CE:
"+str(SPl[4])+ "  CF: "+
        str(SPl[5])+"  CG: " + str(SPl[6]))
    print("Questions that met a criterion:
"+str(SPl[7]))
    print("Total questions: "+ str(SPl[8]))

def print_CHEM_nums(list_name):
    SPl=list_name
    print("EA: "+str(SPl[0])+ "  EB: "+str(SPl[1])+ "
EC: "+
        str(SPl[2])+ "  ED: "+str(SPl[3]))
    print("Questions that met a criterion:
"+str(SPl[4]))
    print("Total questions: "+ str(SPl[5]))

def print_PHYS_nums(list_name):
    SPl=list_name
    print("DA: "+str(SPl[0])+ "  DB: "+str(SPl[1])+ "
DC: "+
        str(SPl[2])+ "  DD: "+str(SPl[3])+ "  DE:
"+str(SPl[4]))
    print("Questions that met a criterion:
"+str(SPl[5]))
    print("Total questions: "+ str(SPl[6]))

def main():
    first_list=[]
    bio_list=[]
    chem_list=[]
    phys_list=[]
    for i in range(6):
        filename=input("FILE: ")
        file_list=files_to_lists(filename)
        SP_and_CC=get_array(file_list)
        first_list.append(SP_and_CC)
        answ=input("bio, chem, or phys? ")
        # asks which it is so it knows which core to
count
        # may have to run twice, once for Course 3
under chem
        # and once for Course 3 under bio
        while answ!="bio" and answ!="chem" and
answ!="phys":
            answ=input("bio, chem, or phys? ")
        if answ=="bio":
            b_list_core=BIO_Core(file_list)
            bio_list.append(b_list_core)
        if answ=="chem":
            c_list_core=CHEM_Core(file_list)
            chem_list.append(c_list_core)
        if answ=="phys":
            p_list_core=PHYS_Core(file_list)
            phys_list.append(p_list_core)
    SPl=get_SPsums(first_list)
    CCl=get_CCsums(first_list)
    chems_list=get_more_sums(chem_list)
    BCl=get_more_sums(bio_list)
    PCl=get_more_sums(phys_list)
    print_SP_nums(SPl)
    print()
    print_CC_nums(CCl)
    print()
    print_BIO_nums(BCl)
    print()
    print_CHEM_nums(chems_list)
    print()
    print_PHYS_nums(PCl)

if __name__=='__main__':
    main()
```

Appendix D

Course	Year	Exam	Question	Category		Score	Goal_1	Goal_2
1	2006	Exam1	1	Process		1	AD	
1	2006	Exam1	1	Content		1	CF	
1	2006	Exam1	1	CC		1	BA	
1	2006	Exam1	2	Process		1	AA	AC
1	2006	Exam1	2	Content		1	CF	
1	2006	Exam1	2	CC		1	BA	
1	2006	Exam1	3	Process		0		
1	2006	Exam1	3	Content		0		
1	2006	Exam1	3	CC		1	BE	BA
1	2006	Exam1	4	Process		1	AB	AD
1	2006	Exam1	4	Content		1	CF	
1	2006	Exam1	4	CC		1	BB	
1	2006	Exam1	5	Process		0		
1	2006	Exam1	5	Content		1	CF	
1	2006	Exam1	5	CC		1	BA	BE
1	2006	Exam1	6	Process		0		
1	2006	Exam1	6	Content		1	CE	
1	2006	Exam1	6	CC		0		
1	2006	Exam1	7	Process		1	AE	
1	2006	Exam1	7	Content		1	CF	
1	2006	Exam1	7	CC		1	BE	BB
1	2006	Exam1	8	Process		0		
1	2006	Exam1	8	Content		1	CF	
1	2006	Exam1	8	CC		0		
1	2006	Exam1	9	Process		1	AF	AE
1	2006	Exam1	9	Content		0		
1	2006	Exam1	9	CC		0		
1	2010	Exam1	1	Process		1	AD	
1	2010	Exam1	1	Content		1	CF	
1	2010	Exam1	1	CC		1	BE	BA
1	2010	Exam1	2	Process		1	AF	AC

1	2010	Exam1	2	Content		1	CF	
1	2010	Exam1	2	CC		1	BB	
1	2010	Exam1	3	Process		1	AA	
1	2010	Exam1	3	Content		1	CF	
1	2010	Exam1	3	CC		1	BA	
1	2010	Exam1	4	Process		0		
1	2010	Exam1	4	Content		1	CF	
1	2010	Exam1	4	CC		0		
1	2010	Exam1	5	Process		1	AD	AC
1	2010	Exam1	5	Content		1	CF	
1	2010	Exam1	5	CC		1	BB	
1	2010	Exam1	6	Process		0		
1	2010	Exam1	6	Content		1	CF	
1	2010	Exam1	6	CC		1	BA	BE
1	2010	Exam1	7	Process		1	AD	AC
1	2010	Exam1	7	Content		1	CF	
1	2010	Exam1	7	CC		1	BA	
1	2010	Exam1	8	Process		1	AE	
1	2010	Exam1	8	Content		1	CF	
1	2010	Exam1	8	CC		1	BE	BB
1	2010	Exam1	9	Process		0		
1	2010	Exam1	9	Content		1	CF	
1	2010	Exam1	9	CC		0		
1	2010	Exam1	10	Process		0		
1	2010	Exam1	10	Content		1	CE	
1	2010	Exam1	10	CC		0		
1	2006	Exam2	1	Process		1	AC	
1	2006	Exam2	1	Content		1	CF	
1	2006	Exam2	1	CC		1	BA	
1	2006	Exam2	2	Process		1	AC	
1	2006	Exam2	2	Content		1	CF	
1	2006	Exam2	2	CC		1	BA	
1	2006	Exam2	3	Process		1	AE	
1	2006	Exam2	3	Content		1	CF	

1	2006	Exam2	3	CC		0		
1	2006	Exam2	4	Process		0		
1	2006	Exam2	4	Content		1	CE	CF
1	2006	Exam2	4	CC		1	BE	
1	2006	Exam2	5	Process		0		
1	2006	Exam2	5	Content		1	CE	
1	2006	Exam2	5	CC		1	BE	
1	2006	Exam2	6	Process		1	AD	
1	2006	Exam2	6	Content		1	CF	
1	2006	Exam2	6	CC		1	BA	BB
1	2006	Exam2	7	Process		0		
1	2006	Exam2	7	Content		1	CE	
1	2006	Exam2	7	CC		0		
1	2006	Exam2	8	Process		1	AG	
1	2006	Exam2	8	Content		1	CF	
1	2006	Exam2	8	CC		1	BB	BA
1	2006	Exam2	9	Process		0		
1	2006	Exam2	9	Content		1	CF	CE
1	2006	Exam2	9	CC		0		
1	2006	Exam2	10	Process		0		
1	2006	Exam2	10	Content		1	CE	CF
1	2006	Exam2	10	CC		1	BF	
1	2006	Exam2	11	Process		1	AB	
1	2006	Exam2	11	Content		0		
1	2006	Exam2	11	CC		0		
1	2009	Exam2	4	Process		0		
1	2009	Exam2	4	Content		1	CF	
1	2009	Exam2	4	CC		0		
1	2009	Exam2	6	Process		1	AE	
1	2009	Exam2	6	Content		1	CF	
1	2009	Exam2	6	CC		0		
1	2009	Exam2	9	Process		1	AC	
1	2009	Exam2	9	Content		1	CE	
1	2009	Exam2	9	CC		1	BB	BE

1	2010	Exam2	5	Process		1	AD	
1	2010	Exam2	5	Content		1	CF	
1	2010	Exam2	5	CC		0		
1	2010	Exam2	7	Process		1	AE	
1	2010	Exam2	7	Content		1	CF	
1	2010	Exam2	7	CC		1	BA	
1	2006	Exam3	1	Process		1	AG	
1	2006	Exam3	1	Content		1	CF	CE
1	2006	Exam3	1	CC		0		
1	2006	Exam3	2	Process		1	AG	
1	2006	Exam3	2	Content		1	CF	
1	2006	Exam3	2	CC		1	BB	
1	2006	Exam3	3	Process		1	AB	
1	2006	Exam3	3	Content		1	CF	
1	2006	Exam3	3	CC		1	BB	
1	2006	Exam3	4	Process		0		
1	2006	Exam3	4	Content		1	CF	
1	2006	Exam3	4	CC		1	BB	
1	2006	Exam3	5	Process		0		
1	2006	Exam3	5	Content		0		
1	2006	Exam3	5	CC		0		
1	2006	Exam3	6	Process		1	AE	
1	2006	Exam3	6	Content		0		
1	2006	Exam3	6	CC		1	BB	
1	2006	Exam3	7	Process		0		
1	2006	Exam3	7	Content		1	CE	
1	2006	Exam3	7	CC		0		
1	2006	Exam3	8	Process		1	AB	
1	2006	Exam3	8	Content		0		
1	2006	Exam3	8	CC		0		
1	2006	Exam3	9	Process		0		
1	2006	Exam3	9	Content		0		
1	2006	Exam3	9	CC		1	BC	
1	2006	Exam3	10	Process		0		

1	2006	Exam3	10	Content		1	CF	
1	2006	Exam3	10	CC		0		
1	2006	Exam3	11	Process		0		
1	2006	Exam3	11	Content		1	CF	
1	2006	Exam3	11	CC		1	BB	
1	2006	Exam3	12	Process		0		
1	2006	Exam3	12	Content		1	CE	
1	2006	Exam3	12	CC		0		
1	2006	Exam3	13	Process		0		
1	2006	Exam3	13	Content		1	CF	
1	2006	Exam3	13	CC		0		
1	2006	Exam3	14	Process		1	AE	
1	2006	Exam3	14	Content		1	CE	
1	2006	Exam3	14	CC		0		
1	2009	Exam3	1	Process		0		
1	2009	Exam3	1	Content		1	CE	
1	2009	Exam3	1	CC		0		
1	2009	Exam3	2	Process		0		
1	2009	Exam3	2	Content		1	CC	
1	2009	Exam3	2	CC		0		
1	2009	Exam3	3	Process		0		
1	2009	Exam3	3	Content		1	CF	
1	2009	Exam3	3	CC		0		
1	2009	Exam3	4	Process		0		
1	2009	Exam3	4	Content		1	CF	
1	2009	Exam3	4	CC		1	BE	
1	2009	Exam3	4.2	Process		0		
1	2009	Exam3	4.2	Content		1	CC	
1	2009	Exam3	4.2	CC		0		
1	2009	Exam3	5	Process		1	AB	
1	2009	Exam3	5	Content		1	CE	
1	2009	Exam3	5	CC		0		
1	2009	Exam3	7	Process		0		
1	2009	Exam3	7	Content		1	CE	

1	2009	Exam3	7	CC		0		
1	2009	Exam3	10	Process		1	AE	
1	2009	Exam3	10	Content		1	CF	
1	2009	Exam3	10	CC		1	BB	
1	2009	Exam3	11	Process		0		
1	2009	Exam3	11	Content		1	CE	
1	2009	Exam3	11	CC		0		
1	2010	Exam3	1	Process		0		
1	2010	Exam3	1	Content		1	CE	
1	2010	Exam3	1	CC		0		
1	2010	Exam3	2	Process		1	AB	
1	2010	Exam3	2	Content		0		
1	2010	Exam3	2	CC		1	BA	
1	2010	Exam3	3	Process		0		
1	2010	Exam3	3	Content		1	CE	
1	2010	Exam3	3	CC		0		
1	2010	Exam3	4	Process		1	AB	
1	2010	Exam3	4	Content		1	CF	
1	2010	Exam3	4	CC		0		
1	2010	Exam3	5	Process		1	AG	
1	2010	Exam3	5	Content		1	CE	
1	2010	Exam3	5	CC		0		
1	2010	Exam3	6	Process		0		
1	2010	Exam3	6	Content		1	CF	
1	2010	Exam3	6	CC		1	BB	
1	2010	Exam3	7	Process		0		
1	2010	Exam3	7	Content		1	CE	
1	2010	Exam3	7	CC		1	BE	
1	2010	Exam3	8	Process		0		
1	2010	Exam3	8	Content		1	CF	
1	2010	Exam3	8	CC		0		
1	2010	Exam3	9	Process		0		
1	2010	Exam3	9	Content		0		
1	2010	Exam3	9	CC		0		

1	2010	Exam3	10	Process		0		
1	2010	Exam3	10	Content		1	CF	
1	2010	Exam3	10	CC		0		
1	2010	Exam3	11	Process		0		
1	2010	Exam3	11	Content		1	CF	
1	2010	Exam3	11	CC		0		
1	2010	Exam3	12	Process		0		
1	2010	Exam3	12	Content		1	CF	
1	2010	Exam3	12	CC		0		
1	2010	Exam3	13	Process		0		
1	2010	Exam3	13	Content		1	CE	
1	2010	Exam3	13	CC		0		
1	2010	Exam3	14	Process		1	AE	
1	2010	Exam3	14	Content		1	CF	
1	2010	Exam3	14	CC		0		
1	2006	Final	1	Process		1	AE	
1	2006	Final	1	Content		1	CF	
1	2006	Final	1	CC		1	BE	
1	2006	Final	2	Process		1	AD	
1	2006	Final	2	Content		1	CG	
1	2006	Final	2	CC		0		
1	2006	Final	3	Process		1	AD	
1	2006	Final	3	Content		1	CF	
1	2006	Final	3	CC		0		
1	2006	Final	4	Process		0		
1	2006	Final	4	Content		1	CA	
1	2006	Final	4	CC		1	BE	
1	2006	Final	5	Process		0		
1	2006	Final	5	Content		1	CF	
1	2006	Final	5	CC		1	BE	BB
1	2006	Final	6	Process		1	AE	AD
1	2006	Final	6	Content		1	CG	
1	2006	Final	6	CC		1	BA	BC
1	2006	Final	7	Process		0		

1	2006	Final	7	Content		1	CA	
1	2006	Final	7	CC		1	BE	
1	2006	Final	8	Process		0		
1	2006	Final	8	Content		1	CA	
1	2006	Final	8	CC		1	BE	
1	2006	Final	9	Process		1	AE	
1	2006	Final	9	Content		1	CA	CE
1	2006	Final	9	CC		1	BE	
1	2006	Final	10	Process		0		
1	2006	Final	10	Content		1	CG	
1	2006	Final	10	CC		1	BB	
1	2006	Final	11	Process		1	AB	
1	2006	Final	11	Content		1		
1	2006	Final	11	CC		0		
1	2006	Final	12	Process		0		
1	2006	Final	12	Content		1	CG	
1	2006	Final	12	CC		0		
1	2006	Final	13	Process		1	AE	
1	2006	Final	13	Content		1	CG	
1	2006	Final	13	CC		1	BA	
1	2009	Final	1	Process		1	AG	
1	2009	Final	1	Content		1	CE	
1	2009	Final	1	CC		1	BA	BB
1	2009	Final	2	Process		0		
1	2009	Final	2	Content		1	CA	
1	2009	Final	2	CC		0		
1	2009	Final	5	Process		0		
1	2009	Final	5	Content		1	CF	
1	2009	Final	5	CC		1	BE	
1	2009	Final	10	Process		0		
1	2009	Final	10	Content		1	CF	
1	2009	Final	10	CC		0		
1	2009	Final	11	Process		1	AE	
1	2009	Final	11	Content		1	CF	

1	2009	Final	11	CC		1	BE	
1	2009	Final	13	Process		1	AE	
1	2009	Final	13	Content		1	CG	
1	2009	Final	13	CC		1	BB	

Appendix E

Course	Year	Exam	Question	Category		Score	Goal_1	Goal_2
2	2017	Exam1	1	Process		1	AD	
2	2017	Exam1	1	Content		0		
2	2017	Exam1	1	CC		0		
2	2017	Exam1	2	Process		1	AD	
2	2017	Exam1	2	Content		0		
2	2017	Exam1	2	CC		0		
2	2017	Exam1	3	Process		0		
2	2017	Exam1	3	Content		0		
2	2017	Exam1	3	CC		0		
2	2017	Exam1	4	Process		1	AD	
2	2017	Exam1	4	Content		0		
2	2017	Exam1	4	CC		0		
2	2017	Exam1	5	Process		0		
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2	2017	Exam1	6	Process		1	AA	
2	2017	Exam1	6	Content		0		
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2	2017	Exam1	9	Process		0		
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2	2017	Exam1	9	CC		1	BC	
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2	2017	Exam1	15	CC		0		
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2	2017	Exam1	17	CC		0		
2	2017	Exam1	18	Process		1	AA	
2	2017	Exam1	18	Content		1	ED	
2	2017	Exam1	18	CC		0		
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2	2017	Exam1	24	CC		0		
2	2017	Exam1	25	Process		1	AD	
2	2017	Exam1	25	Content		1	ED	
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2	2017	Exam2	3	CC		0		
2	2017	Exam2	4	Process		1	AA	
2	2017	Exam2	4	Content		1	ED	
2	2017	Exam2	4	CC		1	BD	
2	2017	Exam2	5	Process		1	AD	
2	2017	Exam2	5	Content		1	ED	
2	2017	Exam2	5	CC		0		
2	2017	Exam2	6	Process		1	AD	
2	2017	Exam2	6	Content		1	ED	
2	2017	Exam2	6	CC		0		
2	2017	Exam2	7	Process		1	AD	
2	2017	Exam2	7	Content		1	EB	
2	2017	Exam2	7	CC		0		
2	2017	Exam2	8	Process		0		
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2	2017	Exam2	9	Content		1	EB	
2	2017	Exam2	9	CC		1	BC	
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2	2017	Exam2	11	Content		1	EC	
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2	2017	Exam2	12	Content		1	EC	
2	2017	Exam2	12	CC		1	BC	
2	2017	Exam2	13	Process		1	AD	
2	2017	Exam2	13	Content		1	EC	
2	2017	Exam2	13	CC		0		
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2	2017	Exam2	14	Content		1	EC	
2	2017	Exam2	14	CC		0		
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2	2017	Exam2	15	Content		1	EB	
2	2017	Exam2	15	CC		1	BC	
2	2017	Exam2	16	Process		1	AA	
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2	2017	Exam2	17	Process		1	AD	
2	2017	Exam2	17	Content		1	EC	
2	2017	Exam2	17	CC		0		
2	2017	Exam2	18	Process		1	AD	
2	2017	Exam2	18	Content		1	EC	
2	2017	Exam2	18	CC		0		
2	2017	Exam2	19	Process		0		
2	2017	Exam2	19	Content		1	EC	
2	2017	Exam2	19	CC		1	BD	
2	2017	Exam2	20	Process		1	AD	

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2	2017	Exam2	20	CC		0		
2	2017	Exam2	21	Process		1	AD	
2	2017	Exam2	21	Content		1	EC	
2	2017	Exam2	21	CC		0		
2	2017	Exam2	22	Process		0		
2	2017	Exam2	22	Content		1	EC	
2	2017	Exam2	22	CC		1	BE	
2	2017	Exam2	23	Process		1	AD	
2	2017	Exam2	23	Content		1	EC	
2	2017	Exam2	23	CC		0		
2	2017	Exam2	24	Process		1	AD	
2	2017	Exam2	24	Content		1	EC	
2	2017	Exam2	24	CC		0		
2	2017	Exam2	25	Process		1	AD	
2	2017	Exam2	25	Content		1	EC	
2	2017	Exam2	25	CC		0		
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2	2017	Exam3	1	Content		1	EC	
2	2017	Exam3	1	CC		0		
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2	2017	Exam3	2	Content		1	EC	
2	2017	Exam3	2	CC		0		
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2	2017	Exam3	3	Content		1	EC	
2	2017	Exam3	3	CC		0		
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2	2017	Exam3	4	Content		1	EC	
2	2017	Exam3	4	CC		0		
2	2017	Exam3	5	Process		1	AD	
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2	2017	Exam3	6	CC		0		
2	2017	Exam3	7	Process		0		
2	2017	Exam3	7	Content		1	EB	
2	2017	Exam3	7	CC		0		
2	2017	Exam3	8	Process		0		
2	2017	Exam3	8	Content		1	EB	
2	2017	Exam3	8	CC		0		
2	2017	Exam3	9	Process		0		
2	2017	Exam3	9	Content		1	EB	
2	2017	Exam3	9	CC		0		
2	2017	Exam3	10	Process		0		
2	2017	Exam3	10	Content		1	EB	
2	2017	Exam3	10	CC		0		
2	2017	Exam3	11	Process		1	AA	
2	2017	Exam3	11	Content		1	EB	
2	2017	Exam3	11	CC		0		
2	2017	Exam3	12	Process		0		
2	2017	Exam3	12	Content		0		
2	2017	Exam3	12	CC		0		
2	2017	Exam3	13	Process		0		
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2	2017	Exam3	13	CC		0		
2	2017	Exam3	14	Process		1	AA	
2	2017	Exam3	14	Content		1	EB	
2	2017	Exam3	14	CC		0		
2	2017	Exam3	15	Process		1	AA	
2	2017	Exam3	15	Content		1	EC	
2	2017	Exam3	15	CC		0		
2	2017	Exam3	16	Process		1	AA	
2	2017	Exam3	16	Content		1	EC	
2	2017	Exam3	16	CC		0		
2	2017	Exam3	17	Process		0		
2	2017	Exam3	17	Content		1	EB	
2	2017	Exam3	17	CC		1	BE	

2	2017	Exam3	18	Process		1	AD	
2	2017	Exam3	18	Content		1	EC	
2	2017	Exam3	18	CC		0		
2	2017	Exam3	19	Process		0		
2	2017	Exam3	19	Content		1	EA	
2	2017	Exam3	19	CC		0		
2	2017	Exam3	20	Process		0		
2	2017	Exam3	20	Content		1	EA	
2	2017	Exam3	20	CC		0		
2	2017	Exam3	21	Process		1	AG	
2	2017	Exam3	21	Content		1	EB	
2	2017	Exam3	21	CC		1	BE	
2	2017	Exam3	22	Process		0		
2	2017	Exam3	22	Content		1	EA	
2	2017	Exam3	22	CC		0		
2	2017	Exam3	23	Process		1	AA	
2	2017	Exam3	23	Content		1	EB	
2	2017	Exam3	23	CC		1	BE	
2	2017	Exam3	24	Process		1	AA	
2	2017	Exam3	24	Content		1	EB	
2	2017	Exam3	24	CC		0		
2	2017	Exam3	25	Process		1	AA	
2	2017	Exam3	25	Content		1	EB	
2	2017	Exam3	25	CC		0		

Appendix F

Course	Year	Exam	Question	Category		Score	Goal_1	Goal_2
3		Exam1	1	Process		0		
3		Exam1	1	Content		1	ED	
3		Exam1	1	CC		0		
3		Exam1	2	Process		1	AD	
3		Exam1	2	Content		1	EC	
3		Exam1	2	CC		1	BF	
3		Exam1	3	Process		0		
3		Exam1	3	Content		1	ED	
3		Exam1	3	CC		1	BD	
3		Exam1	4	Process		0		
3		Exam1	4	Content		1	EC	
3		Exam1	4	CC		0		
3		Exam1	5	Process		0		
3		Exam1	5	Content		1	ED	
3		Exam1	5	CC		1	BB	
3		Exam1	6	Process		0		
3		Exam1	6	Content		1	EB	
3		Exam1	6	CC		0		
3		Exam1	7	Process		0		
3		Exam1	7	Content		1	EB	
3		Exam1	7	CC		0		
3		Exam1	8	Process		1	AA	
3		Exam1	8	Content		1	CF	
3		Exam1	8	CC		0		
3		Exam1	9	Process		1	AA	
3		Exam1	9	Content		1	EB	
3		Exam1	9	CC		0		
3		Exam1	10	Process		0		
3		Exam1	10	Content		1	EA	
3		Exam1	10	CC		0		
3		Exam1	11	Process		0		

3		Exam1	11	Content		1	EA	
3		Exam1	11	CC		0		
3		Exam1	12	Process		1	AA	
3		Exam1	12	Content		1	EA	
3		Exam1	12	CC		0		
3		Exam1	13	Process		1	AA	AD
3		Exam1	13	Content		1	ED	
3		Exam1	13	CC		0		
3		Exam1	14	Process		0		
3		Exam1	14	Content		1	EA	
3		Exam1	14	CC		0		
3		Exam1	15	Process		0		
3		Exam1	15	Content		1	EB	
3		Exam1	15	CC		0		
3		Exam1	16	Process		1	AA	
3		Exam1	16	Content		1	EB	
3		Exam1	16	CC		1	BA	
3		Exam1	17	Process		1	AA	
3		Exam1	17	Content		1	EB	ED
3		Exam1	17	CC		0		
3		Exam1	18	Process		1	AA	AG
3		Exam1	18	Content		1	EB	
3		Exam1	18	CC		1	BC	
3		Exam1	19	Process		1	AA	AG
3		Exam1	19	Content		1	EB	
3		Exam1	19	CC		0		
3		Exam1	20	Process		0		
3		Exam1	20	Content		1	EA	
3		Exam1	20	CC		1	BB	BE
3		Exam2	1	Process		1	AA	AD
3		Exam2	1	Content		1	ED	
3		Exam2	1	CC		0		
3		Exam2	2	Process		0		
3		Exam2	2	Content		1	CA	

3		Exam2	2	CC		0		
3		Exam2	3	Process		0		
3		Exam2	3	Content		1	EA	
3		Exam2	3	CC		1	BB	
3		Exam2	4	Process		0		
3		Exam2	4	Content		1	EB	
3		Exam2	4	CC		1	BB	
3		Exam2	5	Process		1	AA	
3		Exam2	5	Content		1	CE	
3		Exam2	5	CC		0		
3		Exam2	6	Process		0		
3		Exam2	6	Content		1	EB	
3		Exam2	6	CC		0		
3		Exam2	7	Process		0		
3		Exam2	7	Content		1	EA	
3		Exam2	7	CC		0		
3		Exam2	8	Process		1	AA	
3		Exam2	8	Content		1	EA	
3		Exam2	8	CC		1	BA	
3		Exam2	9	Process		0		
3		Exam2	9	Content		1	ED	
3		Exam2	9	CC		0		
3		Exam2	10	Process		1	AA	
3		Exam2	10	Content		1	EB	
3		Exam2	10	CC		0		
3		Exam2	11	Process		0		
3		Exam2	11	Content		1	EB	
3		Exam2	11	CC		1	BA	
3		Exam2	12	Process		0		
3		Exam2	12	Content		1	CE	
3		Exam2	12	CC		0		
3		Exam2	13	Process		0		
3		Exam2	13	Content		1	CE	
3		Exam2	13	CC		0		

3		Exam2	14	Process		1	AD	
3		Exam2	14	Content		1	EC	
3		Exam2	14	CC		0		
3		Exam2	15	Process		0		
3		Exam2	15	Content		1	CE	
3		Exam2	15	CC		0		
3		Exam2	16	Process		0		
3		Exam2	16	Content		1	CE	
3		Exam2	16	CC		0		
3		Exam2	17	Process		0		
3		Exam2	17	Content		1	CA	
3		Exam2	17	CC		0		
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3		Exam2	18	Content		1	CA	
3		Exam2	18	CC		0		
3		Exam2	19	Process		0		
3		Exam2	19	Content		1	CA	
3		Exam2	19	CC		0		
3		Exam2	20	Process		1	AA	
3		Exam2	20	Content		1	EB	
3		Exam2	20	CC		0		
3		Exam2	21	Process		0		
3		Exam2	21	Content		1	CA	
3		Exam2	21	CC		0		
3		Exam2	22	Process		0		
3		Exam2	22	Content		1	EA	
3		Exam2	22	CC		1	BB	BE
3		Exam2	23	Process		1	AA	AG
3		Exam2	23	Content		1	ED	
3		Exam2	23	CC		0		
3		Exam2	24	Process		1	AC	AD
3		Exam2	24	Content		1	ED	
3		Exam2	24	CC		0		
3		Exam2	25	Process		1	AG	

3		Exam2	25	Content		1	EB	
3		Exam2	25	CC		1	BE	
3		Exam2	26	Process		0		
3		Exam2	26	Content		1	EA	
3		Exam2	26	CC		1	BB	
3		Exam2	27	Process		1	AG	
3		Exam2	27	Content		1	EA	
3		Exam2	27	CC		1	BD	
3		Exam2	28	Process		1	AA	
3		Exam2	28	Content		1		
3		Exam2	28	CC		0		
3		Exam3	1	Process		0		
3		Exam3	1	Content		1	CD	
3		Exam3	1	CC		0		
3		Exam3	2	Process		1	AD	
3		Exam3	2	Content		1	EC	
3		Exam3	2	CC		1	BC	
3		Exam3	3	Process		0		
3		Exam3	3	Content		1	EB	
3		Exam3	3	CC		0		
3		Exam3	4	Process		0		
3		Exam3	4	Content		1	CA	
3		Exam3	4	CC		0		
3		Exam3	5	Process		0		
3		Exam3	5	Content		1	EA	
3		Exam3	5	CC		0		
3		Exam3	6	Process		0		
3		Exam3	6	Content		1	EA	
3		Exam3	6	CC		0		
3		Exam3	7	Process		0		
3		Exam3	7	Content		1	EA	
3		Exam3	7	CC		0		
3		Exam3	8	Process		0		
3		Exam3	8	Content		1	CA	

3		Exam3	8	CC		0		
3		Exam3	9	Process		1	AA	
3		Exam3	9	Content		1	ED	
3		Exam3	9	CC		0		
3		Exam3	10	Process		0		
3		Exam3	10	Content		1	ED	
3		Exam3	10	CC		0		
3		Exam3	11	Process		1	AD	
3		Exam3	11	Content		1	ED	
3		Exam3	11	CC		0		
3		Exam3	12	Process		0		
3		Exam3	12	Content		1	ED	
3		Exam3	12	CC		1	BB	
3		Exam3	13	Process		1	AD	
3		Exam3	13	Content		1	EC	
3		Exam3	13	CC		0		
3		Exam3	14	Process		0		
3		Exam3	14	Content		1	CE	
3		Exam3	14	CC		0		
3		Exam3	15	Process		0		
3		Exam3	15	Content		1	CD	
3		Exam3	15	CC		1	BC	
3		Exam3	16	Process		0		
3		Exam3	16	Content		1	EA	
3		Exam3	16	CC		0		
3		Exam3	17	Process		0		
3		Exam3	17	Content		1	ED	
3		Exam3	17	CC		0		
3		Exam3	18	Process		0		
3		Exam3	18	Content		1	EB	
3		Exam3	18	CC		0		
3		Exam3	19	Process		1	AD	
3		Exam3	19	Content		1	EC	
3		Exam3	19	CC		0		

3		Exam3	20	Process		1	AA	AG
3		Exam3	20	Content		1	ED	
3		Exam3	20	CC		1	BD	
3		Exam3	21	Process		0		
3		Exam3	21	Content		1	ED	
3		Exam3	21	CC		1	BB	
3		Exam3	22	Process		1	AA	
3		Exam3	22	Content		1	EB	
3		Exam3	22	CC		0		
3		Exam3	23	Process		1	AE	
3		Exam3	23	Content		1	ED	
3		Exam3	23	CC		1	BB	
3		Exam3	24	Process		1	AD	
3		Exam3	24	Content		1	EC	
3		Exam3	24	CC		1	BD	

Appendix G

Course	Year	Exam	Question	Category		Score	Goal_1	Goal_2
4		Exam3	1	Process		0		
4		Exam3	1	Content		1	CC	
4		Exam3	1	CC		0		
4		Exam3	2	Process		0		
4		Exam3	2	Content		1	CC	
4		Exam3	2	CC		1	BD	BB
4		Exam3	3	Process		0		
4		Exam3	3	Content		1	CC	
4		Exam3	3	CC		1	BD	
4		Exam3	4	Process		0		
4		Exam3	4	Content		1	CC	
4		Exam3	4	CC		1	BD	
4		Exam3	5	Process		0		
4		Exam3	5	Content		0		
4		Exam3	5	CC		1	BB	BE
4		Exam3	6	Process		0		
4		Exam3	6	Content		1	CC	
4		Exam3	6	CC		0		
4		Exam3	7	Process		0		
4		Exam3	7	Content		1	CC	
4		Exam3	7	CC		0		
4		Exam3	8	Process		0		
4		Exam3	8	Content		1	CC	
4		Exam3	8	CC		0		
4		Exam3	9	Process		0		
4		Exam3	9	Content		1	CC	
4		Exam3	9	CC		1	BA	
4		Exam3	10	Process		0		
4		Exam3	10	Content		1	CC	
4		Exam3	10	CC		0		
4		Exam3	11	Process		0		

4		Exam3	11	Content		1	CF	
4		Exam3	11	CC		0		
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4		Exam3	12	Content		1	CC	CF
4		Exam3	12	CC		0		
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4		Exam3	13	CC		0		
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4		Exam3	14	CC		1	BB	
4		Exam3	15	Process		0		
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4		Exam3	16	CC		0		
4		Exam3	17	Process		0		
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4		Exam3	17	CC		1	BB	
4		Exam3	18	Process		0		
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4		Exam3	18	CC		1	BA	
4		Exam3	19	Process		0		
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4		Exam3	19	CC		1	BA	
4		Exam3	20	Process		1	AF	
4		Exam3	20	Content		0		
4		Exam3	20	CC		0		
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4		Exam3	21	CC		1	BA	
4		Exam3	22	Process		0		
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4		Exam3	22	CC		0		
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4		Exam3	23	CC		0		
4		Exam3	24	Process		1	AA	
4		Exam3	24	Content		1	CF	
4		Exam3	24	CC		0		
4		Exam3	25	Process		1	AD	AA
4		Exam3	25	Content		1	CF	
4		Exam3	25	CC		1	BA	BB
4		Exam3	26	Process		0		
4		Exam3	26	Content		1	CF	
4		Exam3	26	CC		1	BB	BE
4		Exam3	27	Process		1	AC	
4		Exam3	27	Content		1	CF	
4		Exam3	27	CC		1	BA	
4		Exam3	28	Process		0		
4		Exam3	28	Content		1	CF	
4		Exam3	28	CC		1	BA	
4		Exam3	29	Process		0		
4		Exam3	29	Content		1	CF	
4		Exam3	29	CC		1	BA	
4		Exam3	30	Process		1	AD	
4		Exam3	30	Content		1	CF	
4		Exam3	30	CC		1		
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4		Exam4	1	CC		0		
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4		Exam4	2	Content		1	CA	
4		Exam4	2	CC		0		
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4		Exam4	3	CC		0		

4		Exam4	4	Process		0		
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4		Exam4	4	CC		0		
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4		Exam4	5	Content		1	CC	
4		Exam4	5	CC		0		
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4		Exam4	6	CC		0		
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4		Exam4	7	CC		0		
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4		Exam4	9	CC		0		
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4		Exam4	10	CC		0		
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4		Exam4	11	Content		1	CA	
4		Exam4	11	CC		0		
4		Exam4	12	Process		0		
4		Exam4	12	Content		1	CA	
4		Exam4	12	CC		0		
4		Exam4	13	Process		0		
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4		Exam4	13	CC		0		
4		Exam4	14	Process		0		
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4		Exam4	14	CC		0		
4		Exam4	15	Process		0		

4		Exam4	15	Content		1	CF	
4		Exam4	15	CC		0		
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4		Exam4	16	Content		0		
4		Exam4	16	CC		0		
4		Exam4	17	Process		0		
4		Exam4	17	Content		1	CF	
4		Exam4	17	CC		0		
4		Exam4	18	Process		1	AA	
4		Exam4	18	Content		1	CF	
4		Exam4	18	CC		0		
4		Exam4	19	Process		1	AA	
4		Exam4	19	Content		1	CF	
4		Exam4	19	CC		0		
4		Exam4	20	Process		1	AA	AE
4		Exam4	20	Content		1	CF	
4		Exam4	20	CC		1	BB	
4		Exam4	21	Process		0		
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4		Exam4	21	CC		0		
4		Exam4	22	Process		0		
4		Exam4	22	Content		1	CF	
4		Exam4	22	CC		1	BB	
4		Exam4	23	Process		0		
4		Exam4	23	Content		1	CF	
4		Exam4	23	CC		0		
4		Exam4	24	Process		0		
4		Exam4	24	Content		1	CC	
4		Exam4	24	CC		0		
4		Exam4	25	Process		0		
4		Exam4	25	Content		1	CC	
4		Exam4	25	CC		0		
4		Exam4	26	Process		0		
4		Exam4	26	Content		1	CF	

4		Exam4	26	CC		0		
4		Exam4	27	Process		0		
4		Exam4	27	Content		1	CF	
4		Exam4	27	CC		0		
4		Exam4	28	Process		0		
4		Exam4	28	Content		1	CF	
4		Exam4	28	CC		0		
4		Exam4	29	Process		0		
4		Exam4	29	Content		1	CG	
4		Exam4	29	CC		0		
4		Exam4	30	Process		0		
4		Exam4	30	Content		1	CG	
4		Exam4	30	CC		0		
4		Exam4	31	Process		0		
4		Exam4	31	Content		1	CA	
4		Exam4	31	CC		0		
4		Exam4	32	Process		0		
4		Exam4	32	Content		1	CA	
4		Exam4	32	CC		0		
4		Exam4	33	Process		0		
4		Exam4	33	Content		1	CA	
4		Exam4	33	CC		1	BD	
4		Exam4	34	Process		0		
4		Exam4	34	Content		1	CA	
4		Exam4	34	CC		0		
4		Exam4	35	Process		0		
4		Exam4	35	Content		1	CA	
4		Exam4	35	CC		0		
4		Exam4	36	Process		0		
4		Exam4	36	Content		1	CB	
4		Exam4	36	CC		0		
4		Exam4	37	Process		1	AD	
4		Exam4	37	Content		1	CA	
4		Exam4	37	CC		0		

4		Exam4	38	Process		0		
4		Exam4	38	Content		1	CF	
4		Exam4	38	CC		0		
4		Exam4	39	Process		0		
4		Exam4	39	Content		1	CE	
4		Exam4	39	CC		0		
4		Exam4	40	Process		0		
4		Exam4	40	Content		1	CB	
4		Exam4	40	CC		1	BD	
4		Exam4	41	Process		0		
4		Exam4	41	Content		1	CB	
4		Exam4	41	CC		1	BD	
4		Exam4	42	Process		0		
4		Exam4	42	Content		1	CA	
4		Exam4	42	CC		0		
4		Exam4	43	Process		0		
4		Exam4	43	Content		1	CA	
4		Exam4	43	CC		0		
4		Exam4	44	Process		0		
4		Exam4	44	Content		1	CB	
4		Exam4	44	CC		1	BD	
4		Exam4	45	Process		0		
4		Exam4	45	Content		1	CB	
4		Exam4	45	CC		0		
4		Exam4	46	Process		0		
4		Exam4	46	Content		1	CC	
4		Exam4	46	CC		0		
4		Exam4	47	Process		0		
4		Exam4	47	Content		1	CC	
4		Exam4	47	CC		1	BE	
4		Exam4	48	Process		0		
4		Exam4	48	Content		1	CA	
4		Exam4	48	CC		0		
4		Exam4	49	Process		0		

4		Exam4	49	Content		1	CF	
4		Exam4	49	CC		0		
4		Exam4	50	Process		1	AD	
4		Exam4	50	Content		1	CF	
4		Exam4	50	CC		0		
4		Exam4	51	Process		0		
4		Exam4	51	Content		1	CF	
4		Exam4	51	CC		0		
4		Exam4	52	Process		1	AC	
4		Exam4	52	Content		1	CF	
4		Exam4	52	CC		0		
4		Exam4	53	Process		0		
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4		Exam4	53	CC		0		
4		Exam4	54	Process		0		
4		Exam4	54	Content		1	CF	
4		Exam4	54	CC		0		
4		Exam4	55	Process		0		
4		Exam4	55	Content		1	CF	
4		Exam4	55	CC		0		
4		Exam4	56	Process		1	AA	
4		Exam4	56	Content		1	CF	
4		Exam4	56	CC		0		
4		Exam4	57	Process		0		
4		Exam4	57	Content		1	CF	
4		Exam4	57	CC		1	BE	BB
4		Exam4	58	Process		0		
4		Exam4	58	Content		1	CF	
4		Exam4	58	CC		0		
4		Exam4	59	Process		1	AE	
4		Exam4	59	Content		1	CA	
4		Exam4	59	CC		1	BE	BB
4		Exam4	60	Process		0		
4		Exam4	60	Content		1	CG	

4		Exam4	60	CC		0		

Appendix H

Course	Year	Exam	Question	Category		Score	Goal_1	Goal_2
5		Exam1	1	Process		0		
5		Exam1	1	Content		1	CB	
5		Exam1	1	CC		0		
5		Exam1	2	Process		0		
5		Exam1	2	Content		1	CB	
5		Exam1	2	CC		0		
5		Exam1	3	Process		0		
5		Exam1	3	Content		0	CB	CD
5		Exam1	3	CC		0		
5		Exam1	4	Process		0		
5		Exam1	4	Content		1	CE	
5		Exam1	4	CC		0		
5		Exam1	5	Process		0		
5		Exam1	5	Content		1	CE	
5		Exam1	5	CC		0		
5		Exam1	6	Process		0		
5		Exam1	6	Content		1	CB	
5		Exam1	6	CC		1	BE	
5		Exam1	7	Process		0		
5		Exam1	7	Content		1	CB	
5		Exam1	7	CC		0		
5		Exam1	8	Process		0		
5		Exam1	8	Content		1	CD	
5		Exam1	8	CC		0		
5		Exam1	9	Process		0		
5		Exam1	9	Content		1	CB	
5		Exam1	9	CC		0		
5		Exam1	10	Process		0		
5		Exam1	10	Content		0		
5		Exam1	10	CC		0		
5		Exam1	11	Process		0		

5		Exam1	11	Content		0		
5		Exam1	11	CC		0		
5		Exam1	12	Process		0		
5		Exam1	12	Content		1	CB	
5		Exam1	12	CC		0		
5		Exam1	13	Process		0		
5		Exam1	13	Content		1	CD	
5		Exam1	13	CC		0		
5		Exam1	14	Process		0		
5		Exam1	14	Content		0		
5		Exam1	14	CC		0		
5		Exam1	15	Process		0		
5		Exam1	15	Content		0		
5		Exam1	15	CC		0		
5		Exam1	16	Process		0		
5		Exam1	16	Content		1	CE	
5		Exam1	16	CC		0		
5		Exam1	17	Process		0		
5		Exam1	17	Content		1	CE	
5		Exam1	17	CC		0		
5		Exam1	18	Process		0		
5		Exam1	18	Content		1	CE	
5		Exam1	18	CC		0		
5		Exam1	19	Process		0		
5		Exam1	19	Content		1	CE	
5		Exam1	19	CC		0		
5		Exam1	20	Process		0		
5		Exam1	20	Content		1	CE	
5		Exam1	20	CC		0		
5		Exam1	21	Process		0		
5		Exam1	21	Content		0		
5		Exam1	21	CC		0		
5		Exam1	22	Process		0		
5		Exam1	22	Content		1	CE	

5		Exam1	22	CC		0		
5		Exam1	23	Process		0		
5		Exam1	23	Content		0		
5		Exam1	23	CC		0		
5		Exam1	24	Process		0		
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5		Exam1	25	CC		0		
5		Exam1	26	Process		0		
5		Exam1	26	Content		1	CE	
5		Exam1	26	CC		0		
5		Exam1	27	Process		0		
5		Exam1	27	Content		1	CD	
5		Exam1	27	CC		0		
5		Exam1	28	Process		0		
5		Exam1	28	Content		1	CE	
5		Exam1	28	CC		0		
5		Exam1	29	Process		0		
5		Exam1	29	Content		1	CE	
5		Exam1	29	CC		0		
5		Exam1	30	Process		0		
5		Exam1	30	Content		1	CD	
5		Exam1	30	CC		0		
5		Exam2	1	Process		0		
5		Exam2	1	Content		1	CD	
5		Exam2	1	CC		0		
5		Exam2	2	Process		0		
5		Exam2	2	Content		1	CD	
5		Exam2	2	CC		1	BD	
5		Exam2	3	Process		0		
5		Exam2	3	Content		1	CB	
5		Exam2	3	CC		0		

5		Exam2	4	Process		0		
5		Exam2	4	Content		0		
5		Exam2	4	CC		0		
5		Exam2	5	Process		0		
5		Exam2	5	Content		0		
5		Exam2	5	CC		0		
5		Exam2	6	Process		0		
5		Exam2	6	Content		0		
5		Exam2	6	CC		0		
5		Exam2	7	Process		0		
5		Exam2	7	Content		1	CB	CD
5		Exam2	7	CC		0		
5		Exam2	8	Process		0		
5		Exam2	8	Content		1	CE	
5		Exam2	8	CC		0		
5		Exam2	9	Process		0		
5		Exam2	9	Content		1	CB	
5		Exam2	9	CC		0		
5		Exam2	10	Process		0		
5		Exam2	10	Content		1	CB	
5		Exam2	10	CC		0		
5		Exam2	11	Process		0		
5		Exam2	11	Content		1	CD	
5		Exam2	11	CC		0		
5		Exam2	12	Process		0		
5		Exam2	12	Content		1	CC	
5		Exam2	12	CC		0		
5		Exam2	13	Process		0		
5		Exam2	13	Content		1	CC	
5		Exam2	13	CC		0		
5		Exam2	14	Process		0		
5		Exam2	14	Content		1	CE	
5		Exam2	14	CC		1	BB	
5		Exam2	15	Process		0		

5		Exam2	15	Content		1	CB	
5		Exam2	15	CC		0		
5		Exam2	16	Process		0		
5		Exam2	16	Content		1	CD	
5		Exam2	16	CC		0		
5		Exam2	17	Process		0		
5		Exam2	17	Content		0		
5		Exam2	17	CC		0		
5		Exam2	18	Process		0		
5		Exam2	18	Content		1	CA	
5		Exam2	18	CC		0		
5		Exam2	19	Process		0		
5		Exam2	19	Content		1	CE	
5		Exam2	19	CC		0		
5		Exam2	20	Process		0		
5		Exam2	20	Content		1	CE	
5		Exam2	20	CC		0		
5		Exam2	21	Process		0		
5		Exam2	21	Content		1	CB	
5		Exam2	21	CC		0		
5		Exam2	22	Process		0		
5		Exam2	22	Content		1	CB	
5		Exam2	22	CC		0		
5		Exam2	23	Process		0		
5		Exam2	23	Content		1	CB	
5		Exam2	23	CC		0		
5		Exam2	24	Process		0		
5		Exam2	24	Content		1	CE	
5		Exam2	24	CC		1	BB	
5		Exam2	25	Process		0		
5		Exam2	25	Content		1	CB	
5		Exam2	25	CC		0		
5		Exam2	26	Process		0		
5		Exam2	26	Content		0		

5		Exam2	26	CC		0		
5		Exam2	27	Process		0		
5		Exam2	27	Content		1	CD	
5		Exam2	27	CC		0		
5		Exam2	28	Process		0		
5		Exam2	28	Content		1	CB	
5		Exam2	28	CC		0		
5		Exam2	29	Process		0		
5		Exam2	29	Content		1	CG	
5		Exam2	29	CC		0		
5		Exam2	30	Process		0		
5		Exam2	30	Content		1	CB	
5		Exam2	30	CC		0		

Appendix I

Course	Year	Exam	Question	Category		Score	Goal_1	Goal_2
6	2017	Exam1	1	Process		1	AA	
6	2017	Exam1	1	Content		1	DA	
6	2017	Exam1	1	CC		0		
6	2017	Exam1	2	Process		1	AA	
6	2017	Exam1	2	Content		1	DA	
6	2017	Exam1	2	CC		0		
6	2017	Exam1	3	Process		0		
6	2017	Exam1	3	Content		1	DA	
6	2017	Exam1	3	CC		0		
6	2017	Exam1	4	Process		1	AA	AD
6	2017	Exam1	4	Content		1	DA	
6	2017	Exam1	4	CC		0		
6	2017	Exam1	5	Process		0		
6	2017	Exam1	5	Content		1	DA	
6	2017	Exam1	5	CC		1	BB	
6	2017	Exam1	6	Process		1	AA	
6	2017	Exam1	6	Content		1	DA	
6	2017	Exam1	6	CC		0		
6	2017	Exam1	7	Process		1	AD	
6	2017	Exam1	7	Content		1	DA	
6	2017	Exam1	7	CC		0		
6	2017	Exam1	8	Process		1	AD	
6	2017	Exam1	8	Content		1	DA	
6	2017	Exam1	8	CC		0		
6	2017	Exam1	9	Process		1	AA	
6	2017	Exam1	9	Content		1	DA	
6	2017	Exam1	9	CC		0		
6	2017	Exam1	10	Process		1	AD	AA
6	2017	Exam1	10	Content		1	DA	
6	2017	Exam1	10	CC		0		
6	2017	Exam1	11	Process		1	AD	

6	2017	Exam1	11	Content		1	DA	
6	2017	Exam1	11	CC		0		
6	2017	Exam1	12	Process		1	AD	
6	2017	Exam1	12	Content		1	DA	
6	2017	Exam1	12	CC		0		
6	2017	Exam1	13	Process		1	AA	
6	2017	Exam1	13	Content		1	DA	
6	2017	Exam1	13	CC		0		
6	2017	Exam1	14	Process		1	AD	
6	2017	Exam1	14	Content		1	DA	
6	2017	Exam1	14	CC		0		
6	2017	Exam1	15	Process		1	AD	
6	2017	Exam1	15	Content		1	DA	
6	2017	Exam1	15	CC		0		
6	2017	Exam1	16	Process		1	AD	
6	2017	Exam1	16	Content		0		
6	2017	Exam1	16	CC		0		
6	2017	Exam1	17	Process		1	AA	
6	2017	Exam1	17	Content		1	DA	
6	2017	Exam1	17	CC		0		
6	2017	Exam1	18	Process		1	AA	AD
6	2017	Exam1	18	Content		1	DA	
6	2017	Exam1	18	CC		0		
6	2017	Exam1	19	Process		1	AD	AA
6	2017	Exam1	19	Content		0		
6	2017	Exam1	19	CC		0		
6	2017	Exam1	20	Process		1	AA	
6	2017	Exam1	20	Content		1	DA	
6	2017	Exam1	20	CC		1	BB	
6	2017	Exam1	21	Process		1	AD	
6	2017	Exam1	21	Content		1	DA	
6	2017	Exam1	21	CC		0		
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6	2017	Exam1	22	Content		0		

6	2017	Exam1	22	CC		0		
6	2017	Exam1	23	Process		1	AD	
6	2017	Exam1	23	Content		1	DA	
6	2017	Exam1	23	CC		0		
6	2017	Exam1	24	Process		1	AD	
6	2017	Exam1	24	Content		1	DA	
6	2017	Exam1	24	CC		0		
6	2017	Exam1	25	Process		1	AD	AA
6	2017	Exam1	25	Content		1	DA	
6	2017	Exam1	25	CC		0		
6	2017	Exam2	1	Process		1	AA	
6	2017	Exam2	1	Content		0		
6	2017	Exam2	1	CC		0		
6	2017	Exam2	2	Process		1	AD	
6	2017	Exam2	2	Content		0		
6	2017	Exam2	2	CC		0		
6	2017	Exam2	3	Process		1	AD	
6	2017	Exam2	3	Content		1	DA	
6	2017	Exam2	3	CC		0		
6	2017	Exam2	4	Process		1	AD	
6	2017	Exam2	4	Content		0		
6	2017	Exam2	4	CC		0		
6	2017	Exam2	5	Process		1	AA	AD
6	2017	Exam2	5	Content		0		
6	2017	Exam2	5	CC		0		
6	2017	Exam2	6	Process		0		
6	2017	Exam2	6	Content		0		
6	2017	Exam2	6	CC		0		
6	2017	Exam2	7	Process		1	AD	
6	2017	Exam2	7	Content		0		
6	2017	Exam2	7	CC		0		
6	2017	Exam2	8	Process		1	AA	AD
6	2017	Exam2	8	Content		1	DB	
6	2017	Exam2	8	CC		0		

6	2017	Exam2	9	Process		1	AA	AD
6	2017	Exam2	9	Content		1	DA	
6	2017	Exam2	9	CC		0		
6	2017	Exam2	10	Process		1	AA	AD
6	2017	Exam2	10	Content		1	DB	
6	2017	Exam2	10	CC		0		
6	2017	Exam2	11	Process		1	AA	AD
6	2017	Exam2	11	Content		1	DB	
6	2017	Exam2	11	CC		0		
6	2017	Exam2	12	Process		1	AD	
6	2017	Exam2	12	Content		1	DA	
6	2017	Exam2	12	CC		0		
6	2017	Exam2	13	Process		1	AD	
6	2017	Exam2	13	Content		0		
6	2017	Exam2	13	CC		0		
6	2017	Exam2	14	Process		1	AD	
6	2017	Exam2	14	Content		1	DA	
6	2017	Exam2	14	CC		0		
6	2017	Exam2	15	Process		1	AA	AD
6	2017	Exam2	15	Content		1	DA	
6	2017	Exam2	15	CC		1	BD	
6	2017	Exam2	16	Process		1	AA	AD
6	2017	Exam2	16	Content		0		
6	2017	Exam2	16	CC		0		
6	2017	Exam2	17	Process		1	AA	AD
6	2017	Exam2	17	Content		0		
6	2017	Exam2	17	CC		0		
6	2017	Exam2	18	Process		1	AA	
6	2017	Exam2	18	Content		1	DB	
6	2017	Exam2	18	CC		0		
6	2017	Exam2	19	Process		1	AA	AD
6	2017	Exam2	19	Content		1	DB	
6	2017	Exam2	19	CC		1	BD	
6	2017	Exam2	20	Process		1	AA	AD

6	2017	Exam2	20	Content		1	DA	
6	2017	Exam2	20	CC		0		
6	2017	Exam2	21	Process		1	AA	AD
6	2017	Exam2	21	Content		1	DA	
6	2017	Exam2	21	CC		0		
6	2017	Exam2	22	Process		1	AA	AD
6	2017	Exam2	22	Content		1	DB	
6	2017	Exam2	22	CC		0		
6	2017	Exam2	23	Process		1	AA	AD
6	2017	Exam2	23	Content		1	DA	
6	2017	Exam2	23	CC		0		
6	2017	Exam2	24	Process		1	AA	AD
6	2017	Exam2	24	Content		1	DA	
6	2017	Exam2	24	CC		0		
6	2017	Exam2	25	Process		1	AD	
6	2017	Exam2	25	Content		0		
6	2017	Exam2	25	CC		0		
6	2017	Exam3	1	Process		1	AA	
6	2017	Exam3	1	Content		1	DA	
6	2017	Exam3	1	CC		0		
6	2017	Exam3	2	Process		1	AD	
6	2017	Exam3	2	Content		1	DA	
6	2017	Exam3	2	CC		0		
6	2017	Exam3	3	Process		1	AD	
6	2017	Exam3	3	Content		1	DA	
6	2017	Exam3	3	CC		0		
6	2017	Exam3	4	Process		1	AD	
6	2017	Exam3	4	Content		1	DC	
6	2017	Exam3	4	CC		0		
6	2017	Exam3	5	Process		0		
6	2017	Exam3	5	Content		1	DA	
6	2017	Exam3	5	CC		1	BE	
6	2017	Exam3	6	Process		1	AA	AD
6	2017	Exam3	6	Content		0		

6	2017	Exam3	6	CC		0		
6	2017	Exam3	7	Process		0		
6	2017	Exam3	7	Content		1	DA	
6	2017	Exam3	7	CC		1	BE	
6	2017	Exam3	8	Process		1	AA	AD
6	2017	Exam3	8	Content		1	DA	
6	2017	Exam3	8	CC		0		
6	2017	Exam3	9	Process		1	AA	
6	2017	Exam3	9	Content		1	DA	
6	2017	Exam3	9	CC		0		
6	2017	Exam3	10	Process		1	AA	AD
6	2017	Exam3	10	Content		1	DB	
6	2017	Exam3	10	CC		0		
6	2017	Exam3	11	Process		1	AA	AD
6	2017	Exam3	11	Content		1	DA	
6	2017	Exam3	11	CC		0		
6	2017	Exam3	12	Process		1	AA	AD
6	2017	Exam3	12	Content		1	DA	
6	2017	Exam3	12	CC		0		
6	2017	Exam3	13	Process		1	AD	
6	2017	Exam3	13	Content		1	DA	
6	2017	Exam3	13	CC		0		
6	2017	Exam3	14	Process		1	AA	AD
6	2017	Exam3	14	Content		1	DA	
6	2017	Exam3	14	CC		0		
6	2017	Exam3	15	Process		1	AA	
6	2017	Exam3	15	Content		1	DA	
6	2017	Exam3	15	CC		1	BE	
6	2017	Exam3	16	Process		1	AD	
6	2017	Exam3	16	Content		1	DA	
6	2017	Exam3	16	CC		0		
6	2017	Exam3	17	Process		1	AD	
6	2017	Exam3	17	Content		0		
6	2017	Exam3	17	CC		0		

6	2017	Exam3	18	Process		1	AA	
6	2017	Exam3	18	Content		1	DA	
6	2017	Exam3	18	CC		0		
6	2017	Exam3	19	Process		1	AA	AD
6	2017	Exam3	19	Content		1	DA	
6	2017	Exam3	19	CC		0		
6	2017	Exam3	20	Process		1	AA	AD
6	2017	Exam3	20	Content		1	DA	
6	2017	Exam3	20	CC		0		
6	2017	Exam3	21	Process		1	AA	AD
6	2017	Exam3	21	Content		0		
6	2017	Exam3	21	CC		0		
6	2017	Exam3	22	Process		1	AA	AD
6	2017	Exam3	22	Content		0		
6	2017	Exam3	22	CC		0		
6	2017	Exam3	23	Process		1	AA	AD
6	2017	Exam3	23	Content		1	DB	
6	2017	Exam3	23	CC		0		
6	2017	Exam3	24	Process		1	AA	AD
6	2017	Exam3	24	Content		1	DA	
6	2017	Exam3	24	CC		0		
6	2017	Exam3	25	Process		1	AA	
6	2017	Exam3	25	Content		1	DA	
6	2017	Exam3	25	CC		0		