Comparing the Effectiveness of Semester-long vs. Accelerated-summer Course Offerings

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Abstract

Many of the foundational courses in undergraduate engineering programs are essential pre-requisites for the core major-specific courses pertaining to the respective engineering degree, and hence typically have high enrollments. As a result, in addition to being offered during the regular semesters (Fall and Spring semesters, which are typically about 15 weeks in duration), many of these are also offered in an accelerated format over summer sessions (typically about 5 weeks in duration). Such a different manner of offering the same course over drastically different durations is expected to have dissimilar levels of effectiveness – this paper is thus a comparative inquiry into the same.

To compare the various aspects of effectiveness related to the difference in duration/format of course offerings, two sophomore-level foundational courses offered in the Manufacturing & Mechanical Engineering Technology (MMET) program within the Engineering Technology & Industrial Distribution (ETID) department at Texas A&M University (TAMU) were selected – one titled "Metallic Materials" (MMET 207) and the other "Mechanics for Technologists" (MMET 275).These were offered during the regular semesters as well as over summer sessions (5 weeks in duration), and each instructed by the same respective professors throughout the year.

The evaluation mechanisms employed primarily involved comparing student performance in individual assignments as well as the overall grades, comparative tracking of student performance as the course progressed, as well as in immediately succeeding courses, offering-specific comments in course/instructor evaluations as well as via surveys meant to gauge student impressions. Altogether, the results tend to show that although students generally did not prefer an accelerated-format from a convenience standpoint, they in fact performed better in the accelerated format offerings, as well as in the immediately succeeding courses.

1. Introduction

The Manufacturing & Mechanical Engineering Technology (MMET) program has three main topic tracks in the dedicated curriculum as shown in Fig. 1. The two foundational materials courses, MMET 206 and 207, an introductory manufacturing course, MMET 181, and the engineering mechanics course, MMET 275, are the basics of two of the three emphasis areas, and are the encouraged courses for first semester MMET major students.

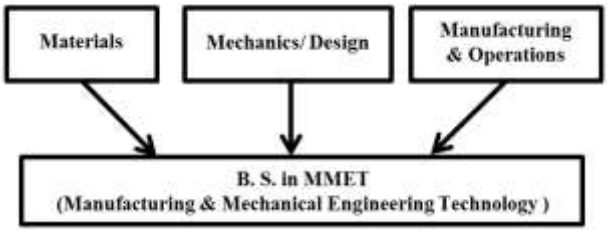

Fig. 1: The 3 main topic tracks in the dedicated MMET curriculum

Summer courses have been offered recently as a way to accommodate recent transfers from the College's Entry to a Major (ETAM) program. Incoming freshmen are no longer admitted straight into the degree of their choice, but instead are admitted as General Engineering students. After meeting certain course and GPA requirements, these students are permitted to apply to degree programs of their choice. Once admitted, they transfer immediately to that department, and enroll in courses specific to their new major. The summer courses also are beneficial to new transfers from outside the University, as these classes do not typically have equivalents available at other schools, other than MMET 275 (mechanics) in some cases. Not everyone avail themselves of this opportunity. Students have commented that they don't take summer classes in order to participate in internships and to a lesser degree, study abroad courses.

The Metallic Materials course MMET 207 and the Mechanics for Technologists course MMET 275 are prerequisites for the MMET 376 Strength of Materials course, and also serve as the beginning of the longest sequence of courses in the curriculum leading to graduation. See Fig. 2. Student success in these basic courses is critical to their success in later classes, and to their timely completion of the degree. Those who take the courses in the summer have a very short gap before the follow on class is taken in the fall, and therefore, have less time to 'forget' the material.

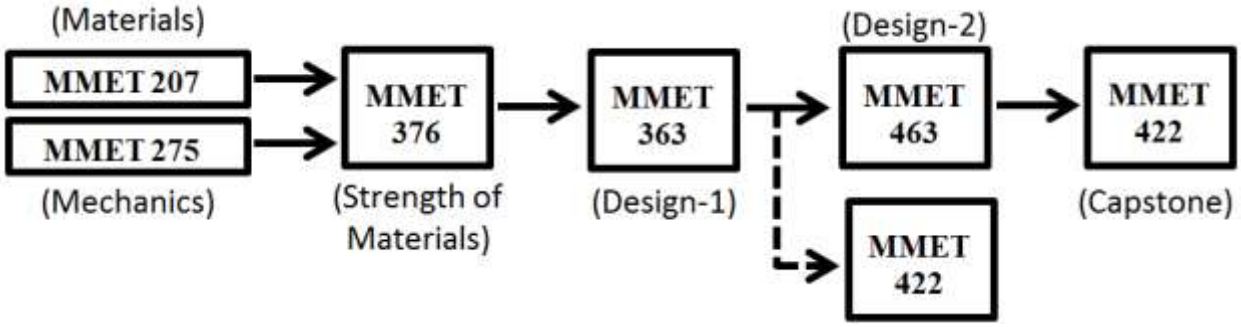

Fig. 2: Longest sequence of courses in the MMET curriculum leading to graduation

MMET 207 is a 2 hour lecture/2 hour laboratory per week format in the regular semester. The lecture introduces mechanical testing, making and processing, the characteristics, use and heat treating of carbon and alloy steel, tool steels, stainless steels, cast irons, and aluminums, as well as corrosion. The laboratory component has the students perform mechanical testing, heat treating, metallographic specimen preparation and inspection, and cold working of metals. Learning is focused toward knowledge retention and application – recalling facts and leveraging their understanding about the materials (metals) and being able to make decisions and selections based on those facts. MMET 275 is a 3 hour lecture per week in the regular semester. This is essentially a statics course where the learning outcomes include the students being able to apply the concepts and procedures enabling them to identify, idealize and analyze mechanical force systems via sketches and free-body diagrams, apply 2D/3D equations of equilibrium to particle and rigid-body systems for solving problems involving trusses, frames, machines and other structural and mechanical systems, and to be able to find geometric and mass properties of collections of areas/volumes, to be able to find internal forces developed in structural members, and to be able to apply the concepts of dry friction. Altogether, the course emphasis is on understanding physics/mechanics concepts and being able to apply them to real-world problems.

2. Background and Literature Review

Summer classes have been studied for their efficacy in preparing students, though not much work has been done with engineering related classes. Marshall et al found that student grades in summer biology classes were higher than those in the regular semester. One student though expressed concern to the researchers about retention of the material [1]. To address concerns about student learning in a shorter summer session, faculty revised a course to implement unique active learning exercises different than those in the regular semester in order to improve student success [2].

Courses across Santa Monica College were evaluated for passing grades (A, B, C, or Pass). Researchers found that, overall, students performed better in the shorter session courses than in longer semester courses [3]. Upon review of studies of shorter term courses such as summer session compared to a regular semester, Daniel found that student test scores were higher in the shorter classes, but not all studies looked at long term student learning. Also the observation was made that faculty had to prepare the courses much more carefully to preserve student success. Engineering courses were not included specifically in this review [4]. The previously mentioned works did not specifically try to determine why the summer course success was higher. Spurling reached the conclusion that both intensity of study and compression of the semester account for an increase in the students' success in summer classes compared to the regular semester [5].

The class size in the summer session courses is normally smaller, which may be the reason that students tend to fare better. At one university, class sizes were shown to be inversely related to student grades at all sizes, with the greatest drop occurring as classes increase up to a size of 20, then more gradually declining with increasing class sizes. This study was done over a wide range of courses, and the researchers did not find any variance due to course type, student background or preparation [6]. However, another study focused on class sizes ranging from 10-60. These results indicated that no difference was found in the student end of course grades related to the class size within this range [7].

Course grades are the primary means of assessment, but for foundational courses, class effectiveness should be defined as future course successes as well. There is a lack of research in this area which focuses on engineering based courses in the summer versus regular semesters.

3. Differences in Course Implementation (Semester vs. Summer)

In general, students were registered for a significantly more number of course credits over regular semesters (typically ~12-16 credits, implying about 4-5 courses and labs) as compared to summer session registrations (typically ~3-6 credits, implying about 1-2 courses). In spite of this, students seemed to be generally more relaxed over the longer duration semesters (~15-weeks) when compared to the shorter duration (one-third the duration) summer sessions (~5-weeks) though they were enrolled in significantly more credits/courses during the regular semester. In fact, some students described the summer session classes to be a relatively 'intense' experience in terms of the amount of technical content being covered within a short duration, and its pace overall. In addition to the difference in the amount of technical content being covered, another major difference regarding the deliverables (homework, quizzes, labs and exams) was that the durations between these were significantly shorter in the case of summer sessions as compared to the regular sessions.

For instance, when considering the "Mechanics for Technologists" course, durations between homework (which consisted of about 4 problems on an average) over the regular semester was 1-week, while homework assigned over the summer session (which consisted of about 3 problems on an average) was 2-3 days. Similarly, there was generally1-quiz given each week over the regular semester, while quizzes were given every 2 days over the summer session. When considering exams, the 3 exams covered almost identical content (topics) and was the same duration (same number of problems) whether it was over a regular semester or summer session; however, the exams were spaced 5-weeks apart in the case of the regular semesters, while they were about 1.5-weeks apart in the case of the summer sessions. Altogether, the number of exams were the same, while the number of homework/quizzes were the same or slightly lower for the summer sessions. Thus, the durations between the deliverables were significantly reduced for the summer sessions, and in addition, the durations between the instances the relevant material or concept was introduced in class and when it was tested (via exams) was significantly reduced as well; such duration differences leading to the quantity/quality of material and concept retention is an interesting topic in itself that deserves a separate and more detailed evaluation. Table 1 shows the relevant differences in the schedules of a regular semester vs. a summer session for the "Mechanics for Technologists" course. The "Metallic Materials" course had very similar differences in the regular-semester vs. summer schedules. In general, during the summer schedule, each week's activities spanned almost 2-3 week worth of activities as in a regular semester. Another aspect to be pointed out for the "Metallic Materials" course was that, it had an additional lab component. Thus, though the class sizes were smaller during summer, the lab capacity per session remained the same as this was dictated by the actual physical stations/space available; the only difference was that fall/spring semesters had more lab sections than summer.

Table 1: Comparison of the schedules between semester and summer course offerings

Week	Regular Semester Schedule (15-weeks)	Summer Session Schedule (5-weeks)
1	Intro, Ch-1	Intro, Ch-1, 2 (+2-HW) (+2-Quiz)
2	Ch-2 (+1-HW) (+1-Quiz)	Ch-3,4 (+2-HW) (+2-Quiz)
3	Ch-3 (+1-HW) (+1-Quiz)	Ch-5 (+1-HW) (+1-Quiz) (**Exam-1**)
4	Ch-4 (+1-HW) (+1-Quiz)	Ch-6,7 (+2-HW) (+2-Quiz)
5	Ch-4 (**Exam-1**)	Ch-8,9 (+1-HW) (+1-Quiz) (**Exam-2**)
6	Ch-5 (+1-HW) (+1-Quiz)	Ch-10 (+1-HW) (+1-Quiz) (**Exam-3**)
7	Ch-5 (+1-HW) (+1-Quiz)	
8	Ch-6 (+1-HW) (+1-Quiz)	
9	Ch-6 (+1-HW) (+1-Quiz)	
10	Ch-7 (**Exam-2**)	
11	Ch-7 (+1-HW) (+1-Quiz)	
12	Ch-8 (+1-HW) (+1-Quiz)	
13	Ch-9 (+1-HW) (+1-Quiz)	
14	Ch-10 (+1-HW) (+1-Quiz)	
15	**Exam-3**	

Ch => (Chapter)

The “Metallic Materials” course did not differ in content or assignments from the regular semester to the summer session. The summer class structure was 2 hours of lecture Monday – Thursday, with two 3 hour lab sessions each week. Students had three exams, and a comprehensive final, 10 lab activities, and several extra credit exercises, as was offered during the regular semester. As was the case for MMET 275, MMET 207 summer students did take exams approximately every 1.5 weeks.

Other major differences between these two types of offerings included the class sizes – regular semester offerings were for larger classes (~60-70 students per class for the “Mechanics for Technologists” course and ~70-95 students per class for the “Metallic Materials” course), while the summer sessions were for comparatively smaller classes (~15-20 students per class for the “Mechanics for Technologists” course and ~15-25 students per class for the “Metallic Materials” course). The MMET 207 lab size was held at a maximum of 16, regardless of semester offering, since this was restricted by physical lab space. It is conjectured that the different class sizes and the resulting teacher-to-student ratio, and hence the individual attention that could be afforded to each student could have had an impact on student perception of the topic/instructor and the class in general (and potentially performance) as well, as was reflected in the research. Further, the impact of missing a class/day was much more significant in the case of the summer session offering. Regular semester offerings consisted of two 75-minute class sessions each week (total of 150-minutes/week), while the summer offerings consisted of four 150-minute class sessions each week (total of 600-minutes/week). Hence, missing a summer class day would result in the student missing the instruction to a large portion of a chapter that typically includes introduction of new concepts and topics; they would need to quickly get up to speed (potentially on the same day) to keep up with and follow the material/concepts that would be instructed the very next day; in the case of missing a regular semester class/day, the impact was not as severe, though it had a non-zero impact as well. Additionally, there was either a homework or quiz activity on almost every single class day during the summer session. Thus, missing a class/day had an impact of missing some of the course credit for the final grade as well. In both courses, it was easier (and much more feasible) for students to catch up and maintain their course performance level if missing a regular semester class/day (or even performing poorly in a deliverable such as a homework or a quiz), as compared to missing a summer class/day. Further, the longer summer class sessions (150-minutes, vs. 75-minutes for a regular semester class session, whereby 1 summer class session was equivalent to about 2-3 regular semester class lectures), regardless of whether it was during the forenoon or afternoon, seemed to bring on slight student fatigue (not severe) toward the end of the class sessions even through a short break was provided in between.

It would be interesting to assess the various aspects of student performance in these two different settings – for instance, though it might have felt intense, it could have been beneficial to the student to be ‘immersed’ more deeply and without interruption in a single course’s technical content over a shorter period of time, rather than being introduced to and working on a variety of very contrasting technical content (and associated deliverables) over the duration of the semester. Additionally, the type of course material content might have an effect on the duration too, *i.e.*, an information-retention type course or a problem-practice type course that builds on previous material/concepts over the span of the course duration might be affected by different course durations themselves.

From the instructors' standpoint, besides adjusting to the accelerated format, a quicker turnaround in returning graded assignments (homework, quizzes, labs and exams) as well as providing other forms of individual/group feedback was one of the major administrative changes needed for the summer session offerings. Further, due the drastically shorter duration of the summer offering, handouts and other supplementary material that would normally be distributed throughout the duration of a regular semester, had to be mostly developed and provided beforehand to the students, right at the beginning of the summer session offering. This provision was needed since exams were just about 1.5-weeks apart and hence it was important for the students to obtain an overall perspective of the course as well as be able to start preparing for the major deliverables (exams) as soon as possible. Overall, the instructors felt that they ended up preparing more content/materials for the summer sessions as compared to the regular semesters.

4. Student Performance Data and Assessment

For the "Mechanics for Technologists" course, the grade distributions for the past 6 semesters that included 2 summers were compiled as shown in Fig. 3 and Fig. 4. A very interesting aspect about the grade distribution plot in Fig. 3 is that there were no lower grades (Ds or Fs) during the summer semester, even though the homework, quizzes and exams were very similar to those given in the regular semesters. No particular trend for the summer semesters was noted for the A/B/C grade distributions. When looking at the overall numerical grades of the class (GPAs for the course offering averaged for all students in the class), the summers again showed markedly higher average GPAs (Fig. 4). Finally, Table 2 shows the number of students that Q-dropped from the course as well as those who made a lower grade (Ds and Fs; both are actually considered failing grades within the department) – the data corresponds to the plot given in Fig. 3 where summer offerings saw no q-drops or lower/failing grades.

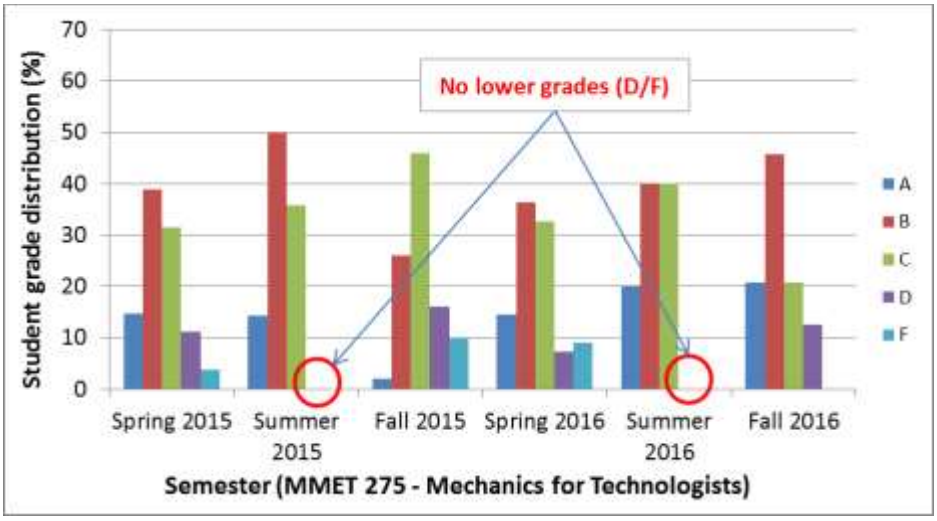

Fig. 3: Grade distributions for MMET 275 over the past 6 semesters that included 2 summers

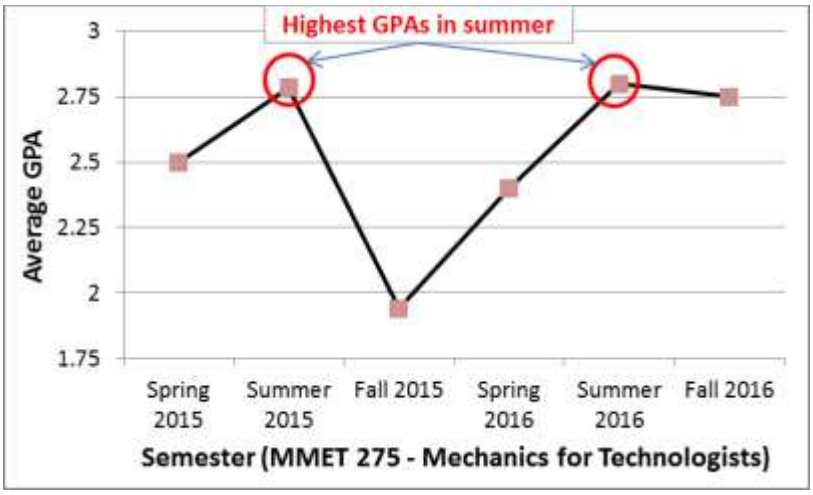

Fig. 4: Average numerical grades for MMET 275, showing higher summer GPAs

Table 2: Number of students in MMET 275 that Q-dropped or made a failing grade

	FA16	SU16	SP16	FA15	SU15	SP15
Q-drops	3	0	2	7	0	1
Grades: D or F	6	0	9	12	0	8
Total	**9**	**0**	**11**	**19**	**0**	**9**

Such a marked difference in student grade distributions over the summers as compared to the regular semesters could be attributed to a combination of factors (not an exhaustive list) which are in line with the differences outlined in the previous section: differences in the course duration, class size, teacher-to-student ratio and the resulting face-to-face interaction, total course loads, etc., and to potentially even seemingly-insignificant factors such as the physical proximity of the students to the instructor in the smaller summer classes, lesser number of on-campus activities, etc. In any case, this trend is definitely worth further evaluation, and might help to set regular semester vs. summer course policies with a view to ensure higher student success.

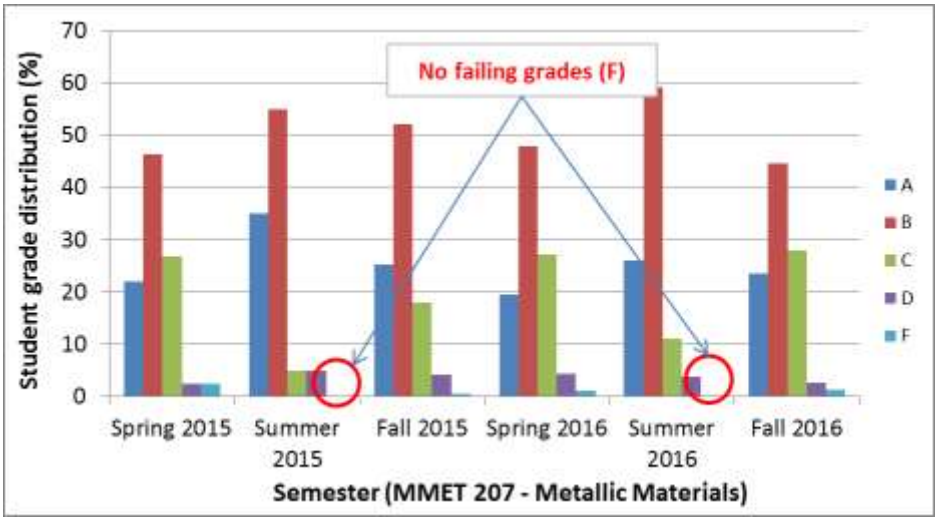

Fig. 5: Grade distributions for MMET 207 over the past 6 semesters that included 2 summers

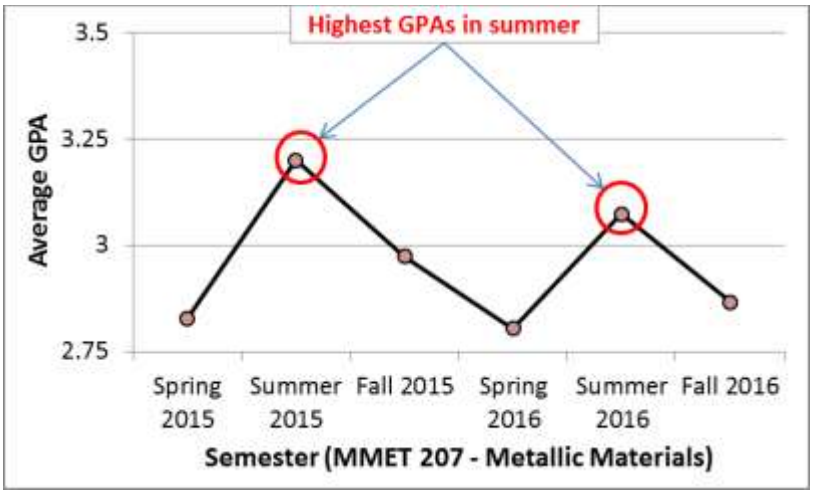

Fig. 6: Average numerical grades for MMET 207, showing higher summer GPAs

Table 3: Number of students in MMET 207 that Q-dropped or made a failing grade

	FA16	SU16	SP16	FA15	SU15	SP15
Q-drops	3	1	11	2	0	4
Grades: D or F	6	1	9	9	1	6
Total	**9**	**2**	**20**	**11**	**1**	**10**

These trends held true for the "Metallic Materials" (MMET 207) course as well as show in Fig 5 and Fig. 6. In this case, summers showed no failing grades (Fs) as compared to the regular semester course grade distributions. Though there were no marked trends in the A/B/C grade distributions, summers generally saw a slighter higher percentage of Bs and a lower percentage of Cs as compared to other regular semester grade distributions (Fig. 5). This was further noted in Fig 6 where average student numerical grades were higher (and over 3.0) during the summer semesters, while they were consistently lower during the other regular semesters. Table 3 shows the number of students that Q-dropped from the course as well as those who made a lower grade (Ds and Fs) – the data corresponds to the plot given in Fig. 5. Such consistent performance indicator trends across both courses over the last 6 offerings could be due to a combination of factors as pointed out earlier; this is deserving of further investigation on its own.

Other aspects to consider regarding these student performance measures include comparing student performance in individual assignments as the course progressed. In general, strong trends or differences were not observed between deliverable/assignment performances in summer vs. regular semesters. Exam and quiz grade averages in summer were marginally higher than those in fall/spring, but not significantly different to warrant special attention. Further, exam and quiz grades improved slightly as the semester progressed, but not with a significant monotonic trend. As it was mentioned before, the true success of foundational courses should be measured by the performance in the succeeding track of courses. Though the department publishes program-averaged numerical grades (average GPA) for all 200-level, 300-level and 400-level courses, and though the 300-level GPA is higher than the 200-level GPA, this cannot be exclusively attributed to the student cognition in his/her foundational courses, however, it does indicate that students tend to perform better as they progress through the degree program.

5. Student Feedback and Assessment

In addition to the assessments conducted in the previous section based on the quantitative measures of student performance, student feedback, both formal and informal, in the form of official teaching evaluations as well as informal student querying/surveys provided a whole additional layer of student perception (and performance within) the course offerings.

When students who took the summer session of the MMET 275 "Mechanics for Technologists" course were queried, some useful offering-specific insights emerged. Relevant comments were:

- "The grading took some time; therefore, there were times when I was not sure about my current standing in the class"
- "Daily exposure keeps concepts fresh in mind"
- "I liked and disliked equally the accelerated format; because I had nothing else going on in the summer, it was totally manageable and I was able to focus intensely in it. However, shorter classes do not give much of a break. Overall, there were things I really liked and things I didn't like about the summer semester"

The above comments reiterate some of the instructor-anticipated changes needed in a summer course offering as compared to a regular semester offering, and then some. In particular, student reaffirmed their desire (and need) to get their graded assignments back and associated feedback as soon as possible. The general protocol was the desire to receive a graded assignment back when at least the next one in the series was being submitted. When considering a regular semester, this corresponded to weekly homework and quizzes being returned within a week; regarding exams, these would be graded with feedback and returned in 1-week as well. However, when considering the summer offering, this schedule corresponded to homework and quizzes having to be graded and returned within 1.5-days; this very tight (desired) schedule was often not met due to the extremely quick turnaround needed. Though there was some more flexibility in returning graded exams (with individual feedback included) during the summer session, this could not be 'delayed' to within a week, since the exams were only about 1.5 weeks apart, and it was important for the students to obtain exam-related feedback early, as it was the most weighted component of the course (25% of the course grade for each exam in MMET 275). Thus, in future summer course offerings, a quick turnaround in returning graded assignments would be made a priority. Additionally, some of the students were also able to identify (quite commendably) that they were understanding concepts, and that these being fresh in their mind were helping them build new knowledge on top of well-placed concepts; such metacognition, at least for a select number of students, is an unanticipated but very rewarding benefit. Finally, there were a number of students with mixed reactions to the summer schedule as well. These reactions were mostly prompted by the perceived (and real) intensity of an 'accelerated' summer course offering. One the one hand they felt a little rushed without too much of a break, however, they also acknowledged that they were able to focus well and handle it as it was one of the only things going on in summer.

In contrast, when students who took the regular semester version of the MMET 275 course were queried on their preference of instead taking it over summer, the relevant comments included:

- "It could be hard to get through all of the material and the understanding of the material would have to be large because you use the material in higher level courses"

This was quite interesting to note that students who took the course over a comparatively more 'relaxed' pace had concerns on first, whether it would be possible to get through all the material,

and second, if so, whether the understanding of the material would be comparable as in a regular semester offering and ample to fare well in the upcoming courses that build on these concepts. Though not currently tested, the authors believe (based on their experience with these students) that such a perspective that these students exhibit could be stemming from their comparatively very heavy regular semester course loads (12-16 credits, translating to 4-5 lecture courses and additional associated labs), where they are essentially running from one class/lab to the next throughout the week. With such a schedule, it is natural for one to find it tough to even fathom that the same course could be completed fruitfully in 1/3rd the time.

Additionally, both sets of students who took the "Mechanics for Technologists" and "Metallic Materials" courses during a regular semester vs. those who took it in summer were informally queried on their preference of taking one or the other offering of the course. The results are shown below in Figure 7 and Figure 8 for the accelerated-summer and regular-semester students respectively. The summer students were asked to compare their experience of taking this summer course with other related courses that they have taken during the regular semesters. While the majority seemed mostly undecided or without a preference, there seemed to be a relatively similar response rate between both "Yes" and "No." Looking more closely at the "no preference" responses in light of the specific question (asking if they preferred the accelerated format), responding in a neutral fashion suggests that that did not specifically prefer the accelerated-summer format. Similarly, the regular-semester students who just completed the course were asked if they would have preferred the course in an accelerated format, to which their responses exhibited a similar distribution of a primarily "no preference" and a relatively equal "Yes"/"No."

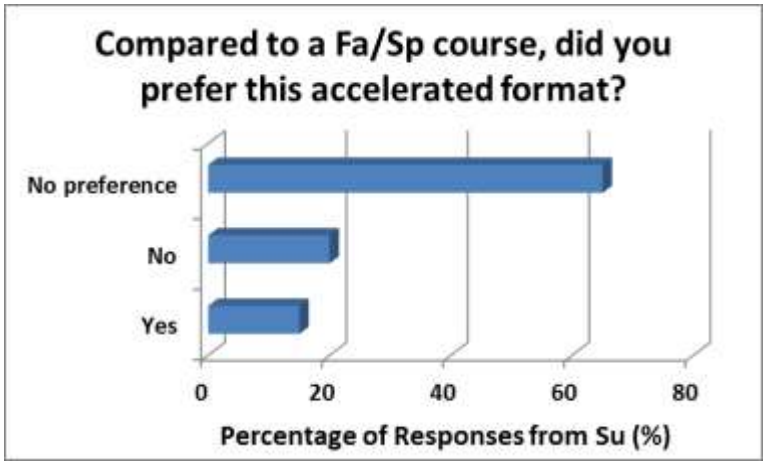

Figure 7: (Summer) student responses to their preference in course offering type (regular-semester vs. accelerated-summer)

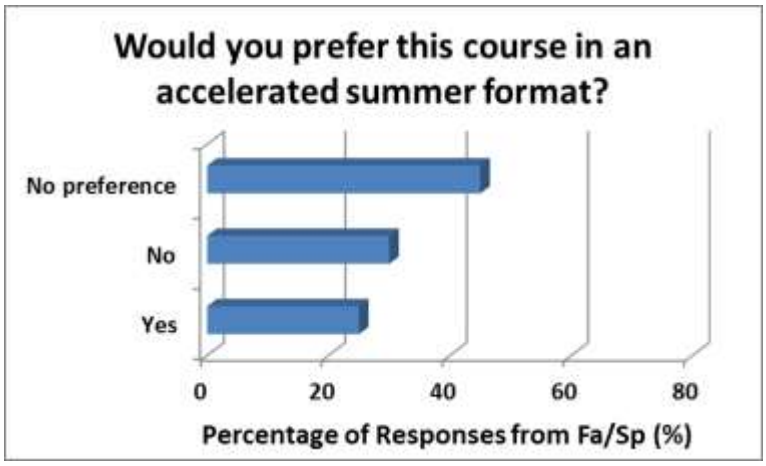

Figure 8: (Fall/Spring) student responses to their preference in course offering type (regular-semester vs. accelerated-summer)

What this suggests is that though students generally seemed undecided between taking this course over a regular semester vs. taking it over summer in an accelerated format, this could be considered from the perspective of them not necessarily strongly wanting to take it over summer, or in other words not to deviate from the experience of taking regular semester courses. This is very relevant to this program since the majority of students are used to regular semester courses only, and only a small portion of the students take summer courses (currently only ~10%).

6. Reflections and Other Considerations

Altogether, when considering student performance and feedback together, a strong case could be made where it would be beneficial to provide summer offerings of foundational courses. This would be especially beneficial for students in many respects, from being able to catch up with a regular course cycle to the concepts being fresh in their minds for use in their upcoming fall semester courses. When asked for their preference, though students were generally undecided, it could be interpreted as them not having a strong preference for summer offerings (and regular course offerings as well). However, quantitative student performance showed that they in fact performed better GPA-wise (with no Q-drops or failing grades) over summer when compared to a regular semester. This alone helps make the case for encouraging further foundational course offerings during summer.

At the same time, it is imperative to note that summer offerings bring up their own set of considerations and challenges. Of primary importance is the need to adjust all aspects of the course instruction, delivery and assessment in a manner that suits an accelerated course schedule (about 1/3rd the duration of a regular semester course). Though it might seem overwhelming at first, over the duration of the course and beyond, students seemed to have benefitted in a significant manner. Further, such an offering in between regular semesters resulted in a number of added benefits as well from the perspective of being foundational courses; this brings up an important consideration, that foundational course success should be gauged based on success in the immediately succeeding courses.

Other considerations for more accurate course performance assessment include tracking any repeaters in these courses to see if they had any significant effect on the overall numerical course

grade, and to generally see how they performed the second time around. But then again, course repeaters are usually present in summer sessions as well as regular semester course offerings. Hence, it would be worthwhile to track their performance as an added metric. Additionally, though it is expected that there would not be any significant difference in the summer course performance of engineering vs. engineering technology students, it would still be worth assessing if this is in fact so.

From the instructors' perspective (who instructed both their respective regular semester and summer sessions), summer sessions seemed to be more convenient and suitable for covering content. This is especially true in the sense that time was not being spent reviewing the material or the concepts from a short previous session. Further, a longer class session allowed for more continuity whereby a new concept and its associated problems could be covered in full without having to split across class sessions. This allowed for a more complete coverage of the course material concepts, and since class sessions were on 4 back-to-back days each week, it was expected that this facilitated better retention and cohesion between class days. Another advantage of the summer sessions what that the students were generally more focused, probably because this one course might have been the major (or only) academic engagement over summer, in contrast to the regular semester when they'd have to juggle between 4-5 classes and associated labs. The disadvantage of these long sessions was of course fatigue which was alleviated to a certain extent via multiple breaks. The faculty was especially affected, in terms of the extra time/effort needed as well as from a productivity/energy standpoint, given their other needed duties in the areas of research and service. However, students did not seem to be as fatigued as expected, maybe because they are used to many hours of class instruction and labs throughout the day during the regular semesters.

7. Conclusions & Future Work

The purpose of this paper was to compare two different types of course offerings (regular-semester vs. accelerated-summer) for two sophomore-level foundational courses, one on materials (that emphasizes information/retention aspects) and the other on mechanics (that emphasizes concept/problem aspects). Such drastically different offerings of the same courses were expected to have differing levels of effectiveness, and this paper served as a comparative inquiry. The evaluation mechanisms primarily consisted of comparing various aspects of student performance quantitatively and through qualitative formal evaluations and informal surveys.

The two types of course offerings had certain drastically contrasting aspects in implementation such as their duration, class size, other accompanying credit/course load, etc. in general the summer offering felt more intense for the students from a content/pace perspective, however, many acknowledged that it was manageable since they had a better focus and fewer other distractions over summer, and that the deeper immersion into a topic might have helped their understanding further. While assessing student performance, the most noticeable metric was that the summer average numerical grade (GPA) was markedly higher than that of the fall/spring semesters, and that there were no Q drops or failing grades (D/F) over summer. This signifies that students generally felt comfortable/confident during the course progression. When queried on whether they would prefer a summer course over a regular semester course, the majority had no preference, signifying that they were not strongly in favor of the summer course. However, the grade distributions showed that they in fact performed better in the summer format.

When considering the future, since summer offerings seem to have definite positive potential in terms of student performance, progression and learning, the intention is to encourage the continued and increased offering of such courses. Further, since these are core foundational courses within the program, the real measure of their success should be gauged by tracking the performance of these specific students in their direct follow-on courses, and not solely via their performance in the summer course alone; a tracking plan is being implemented for this purpose.

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