---------- Original Message ----------
Subject: Program policy
From: "Richard Stock" <stock@cooper.edu>
Date: Tue, January 30, 2018 3:46 pm
To: "Om Agrawal" <om@cooper.edu>
vulakh@cooper.edu
"Stan Mintchev" <mintchev@cooper.edu>
"Robert Smyth" <smyth@cooper.edu>
Cc: "Laura Sparks" <sparks@cooper.edu>
"Natalie Brooks" <nbrooks@cooper.edu>

Math Faculty:
In the Fall 2016 I spoke to you about the discussions the administration and the Trustees had had during the summer (2016) concerning ways to use our financial and physical resources more effectively. Part of that discussion was the issue of teaching courses which routinely meet for more contact hours than is required by the number of course credits. An analysis of the 2015 - 2016 academic year and a valuation of the extra hours of teaching this practice entails indicated an alternative approach would result in considerable advantages in our use of facilities and considerable relief to our teaching loads.

President Sparks has gradually been introducing the operational changes decided by the Trustees as a result of the analysis done in summer 2016. Consequently, beginning in September 2018 the policy of the School of Engineering will be that courses will meet for the number of hours represented by their course credits. I believe this will affect the following required courses taught by the Mathematics Department:

Course Number

Course Title

Course Credits per Section

Current Contact Hours per Section

New Contact Hours per Section

Ma 111

Calculus I

4

5

4

Ma 113

Calculus II

4

5

4

Ma 223

Vector Calculus

2

3

2

Ma 224

Probability

2

3

2

Please review and revise the course syllabi and curriculae to be able to work within these constraints. The Dean's Office will be happy to work with the Mathematics Department in developing common recitation sections and/or enhanced tutoring sessions using adjuncts and/or upper classmen in order to support student learning within this new structure and schedule.

Cooper Union has a strong chance of rising successfully from the turmoil of recent years, however, but that depends on a disciplined approach to using our facilities and expending our financial resources wisely. The administration and the Trustees have determined that these changes in operations will contribute positively to the plans to return The Cooper Union to financial solvency and to "free". Although these changes represent a challenge, the administration has every confidence that we can integrate them into our programs successfully.

Many thanks,

Richard

Richard Stock, PhD
Dean
Albert Nerken School of Engineering
The Cooper Union
41 Cooper Square
New York, NY 10003

212-353-4285
stock@cooper.edu

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---------- Original Message ----------
Subject: Re: Program policy
From: om@cooper.edu
Date: Thu, February 1, 2018 1:15 pm
To: "Richard Stock" <stock@cooper.edu>
Cc: "Om Agrawal" <om@cooper.edu>
vulakh@cooper.edu
"Stan Mintchev" <mintchev@cooper.edu>
"Robert Smyth" <smyth@cooper.edu>
"Laura Sparks" <sparks@cooper.edu>
"Natalie Brooks" <nbrooks@cooper.edu>

Dean Stock:

In this notice, you refer to a Fall 2016 meeting with the Department of Mathematics (the Department), wherein you informed us “about the discussions the administration and the Trustees had had during the summer (2016) concerning ways to use our financial and physical resources more effectively. Part of that discussion was the issue of teaching courses which routinely meet for more contact hours than is required by the number of course credits.”

The Department’s record of this meeting indicates that the faculty members in attendance were professors Om Agrawal, Paul Bailyn, Robert Smyth, Stanislav Mintchev, and Leonid Vulakh. Indeed, the discussion at this meeting turned very briefly to the mismatch between credit hours and contact hours for some of our courses. The Department’s record on the matter indicates that you raised this issue informally, giving Ma 111 as an example. You went on to suggest that perhaps time in such courses could be spent more “efficiently” in order to accommodate a decrease in contact hours.

At the time, the members of the Math Faculty were adamant that such a change would be detrimental to the pedagogy of the Department, both as concerns its mission to provide a firm foundation to all engineering students prior to their further immersion in their respective disciplines, as well as with respect to the Department’s continued ability to teach our 300- and 400-level courses at a level of excellence that supports the Minor in Mathematics. Furthermore, we noted at the time that our ability to offer guidance to independent study students learning advanced topics would also be adversely affected by such a change. (This latter point should give the administration some pause, since it should be noted that the math faculty have no contractual obligation to guide independent study students, and we receive no compensation for our substantial efforts in this area.) Altogether, during this brief discussion, we maintained that the material for Ma 111 would have to be taught at a lesser depth in order to comply with a decrease in the number of contact hours. In the end, you agreed to defer to our professional expertise on this matter, and the discussion on this issue went no further.

Given that discussion of this matter, however informal, was deemed closed at this point, we view your “Program policy” notice below as your first formal communication on the issue of equating contact hours to credit hours for our courses. The administration should have had no expectation that this serious curricular matter, which clearly requires an extended

discussion among not just faculty in the math department, but more generally, the school of engineering, would begin to be addressed in Fall 2016 — especially, not given the tone and the outcome of our Fall 2016 meeting.

For the record, our Fall 2016 meeting with you was mostly focused on a discussion of ways in which the Department could move toward a more uniform offering of its foundational courses, such as instituting a common midterm or a common final examination in the calculus sequence. We agreed that we would attempt a good-faith effort of this by implementing a common homework and common final exam policy across our Ma 111 sections during the following semester (Fall 2017, given the sequencing of courses). As you know, we worked very hard last spring and summer in order to achieve this consensus, and we successfully implemented it last fall. Furthermore, we are currently reviewing this policy in order to determine ways in which to improve our implementation. We view this as an excellent example of our willingness to help the institution, and more specifically, the school of engineering, to rise “successfully from the turmoil of recent years.”

At this time, the Department of Mathematics is severely short-handed; as you know, Prof. Mintchev is on sabbatical leave this semester, Prof. Vulakh is on medical leave, and Prof. Bailyn has retired. We are therefore unable to comply with your request to “review and revise the course syllabi and curricula to be able to work within these constraints.” Needless to say, such an effort requires much more thought and discussion, and would necessitate the expertise of our entire department, in conjunction with the other faculty in the school of engineering, over a much longer time frame.

Thank you for your attention.

Regards,

Om

---------- Original Message ----------
Subject: Following up
From: "Laura Sparks" <sparks@cooper.edu>
Date: Sun, February 11, 2018 6:00 pm
To: om@cooper.edu

Om - In your recent email to Richard, you indicated that addressing the recent management decision to match course credits and hours would require more thought and discussion. Richard and I are certainly open to talking with faculty about all academic issues, including this one, and my understanding is that Richard has had prior discussions with faculty about this matter. I am reaching out to department chairs who have raised concerns over this change for their department and offering them the opportunity to meet regarding their department. If you would like to meet to present your concerns about process or your suggestions for alternative approaches for your department, I will certainly make the time. Since Richard has asked you to make the change, I would ask him to attend as well. This will not be a venue to debate the issues, but rather for me to hear directly from you what your concerns and ideas are. Let me know if you would like to meet. If so, I will ask Lauren to find time. Please let me know whether you would like Lauren to schedule time.

Laura

> On 2/13/2018 10:00 AM, om@cooper.edu wrote:
>> Hi Laura,
>>
>> Thank you for your note. I would very much welcome the opportunity to
>> discuss the particular challenges facing the Department of Mathematics
>> with regards to implementing the proposed management decision of
>> equating credit hours and contact hours in our required courses.
>>
>> I have a strong preference for extending the meeting invitation to
>> include my colleagues Stan Mintchev and Robert Smyth. I believe that both of
>> them can add perspective and depth to this discussion. Please let me know if
>> this is agreeable to you.
>>
>> I would be happy to reach out to Lauren in order to find a common
>> time for us.
>>
>> Regards,
>> Om

On 2/13/2018 11:02 PM, Laura Sparks wrote:
> Thanks, Om. Copying Lauren here so she can help us find a time. For
> now, I'd like to leave it as meetings with chairs only. I want to make
> sure we are handling all meetings consistently, and while I really
> value the input of other faculty members, I expect that the chairs can
> gather the relevant information for their departments and speak on
> behalf of their departments. Lauren is aware that we are trying to
> schedule these meetings soon, so expect that she'll reach out shortly
> to get something on the calendar.
>
> Laura
>
>

_____

---------- Original Message ----------
Subject: Re: Following up
From: "Laura Sparks" <sparks@cooper.edu>
Date: Sun, February 18, 2018 1:00 am
To: om@cooper.edu
"Lauren Desiderio" <laurdesi@cooper.edu>

Dear Om

This is confirmation for our meeting on Thursday, February 22nd at 4:30 pm

The purpose of this meeting is to afford you the opportunity to tell me why the changes announced by Dean Stock cannot work for the Math Department. If you have any alternative suggestions for ways that the Math Department would use facilities and provide considerable relief that allows for more scheduling flexibility to more effectively serve our students, I would welcome your suggestions.

Once I have listened to the facts that you will be presenting at our

meeting, I will take time to analyze the details and respond in a timely manner as I know that scheduling for Academic Year FY19 needs to get underway.

I look forward to meeting with you.

Regards,

Laura

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---------- Original Message ----------
Subject: Re: Following up
From: om@cooper.edu
Date: Tue, February 20, 2018
To: "Laura Sparks" <sparks@cooper.edu>
"Lauren Desiderio" <laurdesi@cooper.edu>

Dear Laura,

I look forward to our meeting on Thursday at 4:30PM in your office. In the meantime, please review the remarks included below. I plan on discussing the various points within in detail during the meeting.

Regards,
Om

The Department of Mathematics appreciates the opportunity to explain why we are convinced that a reduction in the number of contact hours between faculty and students in core mathematics courses will have a broad-reaching negative impact on curricula at The Cooper Union. Below we will express our concerns that this policy change will unavoidably lead to a diminution of the depth and breadth of our students' mathematical preparation, thereby jeopardizing their readiness to excel in the sciences and engineering. We are concerned that members of underrepresented groups within our student body may be disproportionately affected. We are further concerned about our ability to maintain a truly exceptional mathematics minor program. It is also the case that our current circumstances severely limit our ability to mitigate the negative consequences of any curricular changes to be implemented for Fall 2018.

In the mathematics curriculum at Cooper there is no explicit distinction or separation between lecture and recitation. While it is true that some of our instructional hours are used for theory and the rest are used for applications of the material and active practice with the students, the distribution of how time is spent is highly fluid and specific to (1) the pedagogical considerations present with a given cohort of students -and- (2) the timing of topics within the semester. Our time with the students is not explicitly categorized or differentiated, and yet we absolutely need to spend time with our entire classes on both theory and practice. Aside from the fact that the mathematics faculty already provides office hours well beyond contractually stipulated minima, it is also the case that office hours are overcrowded and do not ever have the potential to bring together an entire section of students simultaneously.

The overall impact of these proposed changes would involve cutting down on the depth with which we carry out the instruction, and this eventuality has serious implications.

To get a cursory sense of one major issue, one may consider a sample distinction between theory and practice in mathematics — while discussing the former, an instructor takes the opportunity to show a student a logically complete and self-contained argument for why a certain mathematical technology (theorem, technique, etc.) should work in principle (this discussion stretches the mind and stimulates the imagination; it places the student closer to a position from which he or she might be able to invent such a technology); on the other hand, while discussing practice, the instructor will present a survey of how mathematical technologies can be used / applied. The latter work also stretches the mind, but in a different way — it cues the intellect into thinking about fast associations, computing, and a type of on-the-spot problem-solving ability that is extremely relevant in a cross-disciplinary / applied setting such as within the engineering tracks.

Of note, training in practice often happens interactively, with students at the board while instructors critique their work; it should also be noted that the presence of faculty expertise while this takes place is absolutely paramount — this cannot happen successfully with faculty replaced by undergraduates or master's students. If this active practice were to be led by a student, our experience dictates that in high likelihood, the student leader's response to the work presented would lack the nuance required to improve problem solving and presentation skills. A new teacher's response to a proposed solution is often binary in nature; it tends to focus on the right/wrong dichotomy, often failing to capture the seeds of correct insight in a presentation that ultimately goes wrong, as well as problems in a suboptimal presentation that nevertheless ends up reaching "the correct answer". Also not to be discounted is a faculty member's ability to relate a given problem to other areas of the subject. Lastly, this portion of our teaching time affords us an invaluable feedback channel: it gives us a chance to thoroughly and interactively gauge the thought processes of our students in a way that is not possible within timed examinations. Cutting this portion of our teaching responsibilities in the name of efficiency would be no less absurd than limiting the faculty of the School of Art to only spending time discussing art theory while outsourcing the critique of student artwork to other students.

Now take the Calculus sequence as an example. The proposed changes have the faculty spending 10 hours on that part of the curriculum instead of 13. Since all of the time currently allotted is being utilized, there are only two possibilities, both of which are problematic. Either (1) the last 3/13 portion of this curriculum is cut, or (2) the 13 is somehow condensed into 10 in a manner that must - by way of necessity - make certain cuts to the depth and emphasis of the various topics discussed in these courses. The level of care and foresight that must be exercised in such an undertaking is extraordinary; it requires the expertise of the entire department, which will not be on hand until September 1, 2018 (currently, the math faculty is at 2/5 strength); more broadly, it requires consultation with the faculties of the engineering departments, whose curriculum and pedagogy are directly impacted by such modifications.

Speaking strictly with regards to logistics / feasibility, the above difficulties are simply insurmountable on the timescale proposed in the original "Program policy" notice from Dean Stock. In fact, rushing through this revision process without due diligence and proper consultation will increase the negative impact because of the inevitability of suboptimal decisions.

Quite separately from our concerns regarding logistics and feasibility given

the time constraints, we must point out various other forms of impact by which we are deeply troubled.

The institution has made a commitment to broaden the diversity of underrepresented groups within the student body. Since it is often the case that underrepresented groups are at a significant disadvantage when it comes to preparation for entering and succeeding in college, the Department of Mathematics is particularly concerned about the impact that this policy change will have on our ability to bolster the fundamental core skillset of our incoming students. These fundamental skills are critical for enabling our students to thrive in Cooper's challenging academic environment. To date, we have used every bit of contact time with our students (and in fact, significantly more than what is on the books, in the form of office hours and one-on-one instruction) in order to mitigate such difficulties; and despite our best efforts, there are various indications that we must invest even more time and effort in the future, in order to succeed in this part of our mission.

To the best of our knowledge, there are simply no other mathematics programs in the country that are comparable to ours at Cooper Union, in the following sense: we deliver a very broad, deep curriculum of fundamentals to a diverse set of engineering students pursuing a variety of disciplines. We accomplish this task at a small institution (less than 600 engineering students) with a very small full-time faculty (5 members at steady state). At the same time, we offer a minor in mathematics that is - not just by our own assessment, but also by that of our colleagues at various other institutions - deemed to be comparable to a full major in mathematics at the best universities in the country; the observable evidence of our success in this regard is our track record of placing some of our recent graduates in world-class Ph.D. programs in mathematics over the last few years.

In addition to the broad impact that the reduction of teaching hours would have on the overall training of all students at the School of Engineering, the specific impact to our very talented students with pronounced mathematical strengths and interests in attending graduate school would be particularly severe. The reduced instruction would mean that they see the fundamental 100- and 200- level course material at a lesser depth (often at the cost of the opportunity to see a more abstract presentation of ideas and an introduction to the composition of logical arguments); as a direct consequence, the 300- and up level coursework would have to start much more modestly, and overall it would be accomplishing significantly less in preparing them for Ph.D. programs and careers in the mathematical sciences.

Furthermore, the full-time faculty's teaching commitments (in terms of total courses offered in a given year) will rise to a level that complicates our ability to offer independent studies. Very recently, we sent a very talented student to the University of Chicago's Ph.D. program in mathematics; of note, he had received fellowship offers from all of the 10 or so institutions to which he applied. It is important to point out that a significant proportion of his higher-level mathematical training came through various independent studies completed in addition to the minimal requirements for obtaining the minor in mathematics (his independent studies included courses in dynamical systems, point set and algebraic topology, advanced modern algebra, tensor analysis, and advanced complex analysis, as well as a research problem course during the spring semester of his senior year); we simply would not have been able to provide him with this additional training, if not for the current contact hour allocation scheme (viz., the current allocation scheme allows for the possibility of teaching five courses (instead of six) with the 18 annual contact hours, a freedom that we can exploit when asked to offer an independent study). As a point of special emphasis, we note that the Math department faculty does not receive financial compensation for independent studies; we offer them gratis, as a courtesy for our mathematically inclined students.

---------- Original Message ----------
Subject: Following up
From: "Laura Sparks" <sparks@cooper.edu>
Date: Mon, March 5, 2018 6:44 am
To: om@cooper.edu
Cc: "Richard Stock" <stock@cooper.edu>
"nbrooks@cooper.edu" <nbrooks@cooper.edu>

Dear Om,

Thank you very much for meeting with me regarding your concerns about Dean Stock's decision to match credit and contact hours.I listened intently to your concerns, and while I do agree that in order for the classes to be effective some curriculum change will necessary, I didn't hear any information that would be prohibitive. We can debate the course offerings at other colleges and universities, but I am sure that if we were to delve further we would find all sorts of different models for curriculum scheduling. My focus and our focus must be what will work best for The Cooper Union and our students. I am confident that Dean Stock's decision achieves that, and I support it.

Dean Stock announced this management change back in 2016. He requested that Chairs meet with him to work through alternative solutions. You chose not to. On January 30^th , 2018, he announced that these changes would be implemented for FY19. You and the other faculty within the Mathematics Department have seven months (in addition to the time that was afforded between Dean Stock's 2016 announcement on this topic and now) to rethink and redesign the Mathematics courses being offered. I appreciated some of the ideas that you were already thinking through when we met.

I highly recommend that you work with Dean Stock in the coming months to meet the new credit hour structure that he has outlined for FY19.It sounded to me during our meeting that you might be able to think of alternative solutions. I am confident that with the mutual collaboration of Dean Stock, the Mathematics faculty and with guidance from the Curriculum Committee you will be able to create a robust offering in Mathematics curriculum for our students.

Regards,

Laura