New York City College of Technology, CUNY

CURRICULUM MODIFICATION PROPOSAL FORM

This form is used for all curriculum modification proposals. See the [Proposal Classification Chart](http://openlab.citytech.cuny.edu/collegecouncil/files/2014/08/2013-10-09-Proposal_Classification_Chart.pdf) for information about what types of modifications are major or minor. Completed proposals should be emailed to the Curriculum Committee chair.

|  |  |
| --- | --- |
| **Title of Proposal** | **minor change for MAT 2675** |
| **Date** | **12/9/15** |
| **Major or Minor** | **minor** |
| **Proposer’s Name** | **Neil Katz** |
| **Department** | **Mathematics** |
| **Date of Departmental Meeting in which proposal was approved** | **11/5/15** |
| **Department Chair Name** | **Sandie Han** |
| **Department Chair Signature and Date** |  **12/9/2015** |
| **Academic Dean Name** | **Justin Vazquez-Poritz** |
| **Academic Dean Signature and Date** |  |
| **Brief Description of Proposal**(Describe the modifications contained within this proposal in a succinct summary. More detailed content will be provided in the proposal body. | **It is proposed that a pre/co-requisite of linear algebra (MAT 2580) is added to Calculus III (MAT 2675). In addition the course outline will be changed, removing topics covered in linear algebra and substituting additional topics that are standard for a course in multivariable calculus.** |
| **Brief Rationale for Proposal**(Provide a concise summary of why this proposed change is important to the department. More detailed content will be provided in the proposal body).  | **This is a course required only by applied mathematics majors at NYCCT. Adding a pre/co-requisite of linear algebra will allow the course to cover important additional topics such as Stokes' Theorem, and will allow covering the material using concepts from linear algebra including linear transformations and multivariable linear functions.**  |
| **Proposal History**(Please provide history of this proposal: is this a resubmission? An updated version? This may most easily be expressed as a list). | **This is a new proposal.** |

Please include all appropriate documentation as indicated in the Curriculum Modification Checklist.

For each new course, please also complete the New Course Proposal and submit in this document.

Please submit this document as a single .doc or .rtf format. If some documents are unable to be converted to .doc, then please provide all documents archived into a single .zip file.

**ALL PROPOSAL CHECK LIST**

|  |  |
| --- | --- |
| Completed CURRICULUM MODIFICATION FORM including: |  |
| * Brief description of proposal
 | X |
| * Rationale for proposal
 | X |
| * Date of department meeting approving the modification
 | 11/5/15 |
| * Chair’s Signature
 |  |
| * Dean’s Signature
 |  |
| Evidence of consultation with affected departmentsList of the programs that use this course as required or elective, and courses that use this as a prerequisite. | X |
| Documentation of Advisory Commission views (if applicable). | N/A |
| Completed [Chancellor’s Report Form](http://openlab.citytech.cuny.edu/collegecouncil/files/2014/08/2013-10-09-Chancellor_Report_Quick_Reference_Guide1.doc). | X |

**EXISTING PROGRAM MODIFICATION PROPOSALS**

|  |  |
| --- | --- |
| Documentation indicating core curriculum requirements have been met for new programs/options or program changes.  |  |
| Detailed rationale for each modification (this includes minor modifications) |  |

**Description of Proposal**

MAT 2675 (Calculus III) currently has a prerequisites of MAT 1575. It is proposed to keep this prerequisite and in addition include a pre-/co-requisite of MAT 2580. In addition the course description will be changed to:

A continuation of MAT 1575. Topics include parametric curves, partial derivatives, differentiable multi-variable functions, chain rule for multi-variable functions, vector fields, gradients, divergence, curl, Lagrange multipliers, multiple integrals, line integrals, Green's Theorem, and Stokes' Theorem.

Prerequisite: MAT 1575

Pre-/Co-requisite: MAT 2580

**Rationale for Proposal**

Calculus III (MAT 2675), as currently taught, covers multi-variable calculus but students are not expected to take linear algebra as a pre- or co-requisite course. MAT 2675 is required only for applied mathematics students, who are also required to take linear algebra (MAT 2580), and is an elective course for computer science students, who are also required to take linear algebra. In an effort to give students a better grounding in multi-variable functions, in particular to introduce students to linear multi-variable functions, it is proposed to require that students take linear algebra as a co-requisite or prerequisite to Calculus III. In this way the course can avoid treating vectors and determinants in a different way than in the linear algebra course, while at the same time reinforcing what is covered in that course. Removing introductory material on vectors from the course will also allow covering Stokes' Theorem, a standard topic for multi-variable calculus.



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**Evidence of consultation with affected departments**

What follows is evidence of consultation with departments whose students are taking MAT 2675.

From: "Neil Katz" <nkatz@CityTech.Cuny.Edu>

To: "Tony Cioffi" <TCIOFFI@CityTech.Cuny.Edu>

Subject: mathematics minor curruiculum change

Dear Tony,

The mathematics department is proposing to add a pre-/co-requisite of

MAT 2580 (linear algebra) to MAT 2675 (calculus III).

The reasons for this are that some linear algebra is necessary to learn

multivariable calculus, and the way it is typically covered in calculus

textbooks is very different from the way it is covered in MAT2580, and

is more difficult for students to grasp. So MAT2675 will be a more

successful course, and can cover more material if we rely on MAT2580 to

cover material on vectors.

I'm writing to you as part of the consultation process required for

curriculum changes because, while your programs do not require MAT2675,

some of your students take it anyway.

Best,

Neil

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Date: Fri, 01 Apr 2016 15:24:17 -0400

From: "Neil Katz" <nkatz@CityTech.Cuny.Edu>

To: "Mohammad Razani" <MRazani@CityTech.Cuny.Edu>

Subject: mathematics minor curruiculum change

Dear Professor Razani,

The mathematics department is proposing to add a pre-/co-requisite of

MAT 2580 (linear algebra) to MAT 2675 (calculus III).

The reasons for this are that some linear algebra is necessary to learn

multivariable calculus, and the way it is typically covered in calculus

textbooks is very different from the way it is covered in MAT2580, and

is more difficult for students to grasp. So MAT2675 will be a more

successful course, and can cover more material if we rely on MAT2580 to

cover material on vectors.

I'm writing to you as part of the consultation process required for

curriculum changes because, while your programs do not require MAT2675,

some of your students take it anyway.

Best,

Neil

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Date: Fri, 01 Apr 2016 15:25:19 -0400

From: "Neil Katz" <nkatz@CityTech.Cuny.Edu>

To: "Sidi Berri" <SBerri@CityTech.Cuny.Edu>

Subject: mathematics minor curruiculum change

Dear Professor Berri,

The mathematics department is proposing to add a pre-/co-requisite of

MAT 2580 (linear algebra) to MAT 2675 (calculus III).

The reasons for this are that some linear algebra is necessary to learn

multivariable calculus, and the way it is typically covered in calculus

textbooks is very different from the way it is covered in MAT2580, and

is more difficult for students to grasp. So MAT2675 will be a more

successful course, and can cover more material if we rely on MAT2580 to

cover material on vectors.

I'm writing to you as part of the consultation process required for

curriculum changes because, while your programs do not require MAT2675,

some of your students take it anyway.

Best,

Neil

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Date: Fri, 01 Apr 2016 15:39:32 -0400

From: "Sunghoon Jang" <sjang@CityTech.Cuny.Edu>

To: "Neil Katz" <NKatz@CityTech.Cuny.Edu>

Subject: RE: mathematics minor curruiculum change

Dear Neil,

I will provide you my comments after contacting my colleagues. Have a

good weekend!

Sunghoon

-------- Original message --------

From: Neil Katz <nkatz@CityTech.Cuny.Edu>

Date: 4/1/2016 3:20 PM (GMT-05:00)

To: Sunghoon Jang <SJang@CityTech.Cuny.Edu>

Subject: mathematics minor curruiculum change

>>> "Neil Katz" <nkatz@CityTech.Cuny.Edu> 2016-04-01T15:20:51.504835 >>>

Dear Sunghoon,

The mathematics department is proposing to add a pre-/co-requisite of

MAT 2580 (linear algebra) to MAT 2675 (calculus III).

The reasons for this are that some linear algebra is necessary to learn

multivariable calculus, and the way it is typically covered in calculus

textbooks is very different from the way it is covered in MAT2580, and

is more difficult for students to grasp. So MAT2675 will be a more

successful course, and can cover more material if we rely on MAT2580 to

cover material on vectors.

For applied mathematics majors (and for students in your BTech program)

MAT2580 is a required course.

I'm writing to you as part of the consultation process required for

curriculum changes because, while your programs do not require MAT2675,

some of your students take it anyway.

Best,

Neil

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Date: Fri, 01 Apr 2016 18:25:28 -0400

From: "Justin Vazquez-Poritz" <JVazquez-Poritz@CityTech.Cuny.Edu>

To: "Neil Katz" <NKatz@CityTech.Cuny.Edu>

Cc: "Julian Williams" <JWilliams@CityTech.Cuny.Edu>

Subject: Re: mathematics minor curruiculum change

Dear Neil,

I'm CC-ing Julian Williams on this e-mail.

I do not anticipate that the proposed curriculum change would cause issues

for the LAS or LAA students.

LAS students could take MAT 2580 either as a Capstone or as a free

elective, and take MAT 2675 as a free elective. Moreover, students who

don't have enough free electives available could take either of these

classes without additional cost if they are also taking 12 contributory

credits, though that option is not necessary with enough advance

planning.

While it's always possible that there are rare cases of LAA students with

diverse interests who would take MAT 2675, I would most likely advise such

students that LAS might be the more appropriate program for them anyway.

Best wishes,

Justin

Justin Vazquez-Poritz, PhD

Interim Dean, School of Arts and Sciences

New York City College of Technology

300 Jay Street, Namm 321

Brooklyn, NY 11201=20

Phone: 718-260-5008

Email: JVazquez-Poritz@CityTech.Cuny.Edu

>>> Neil Katz 4/1/2016 3:17 PM >>>

Dear Justin,

As you know, the mathematics department is proposing to add a pre-/co-requi=

site of MAT 2580 (linear algebra) to MAT 2675 (calculus III).

I'm writing to you as part of the consultation process required for =

curriculum changes because, while LAS does not require MAT2675, both it =

and MAT2580 are elective courses. In addition MAT2580 satisfies the =

capstone requirement, so it is not difficult for LAS students to take the =

course. As we discussed it's not reasonable to expect LAA students to =

take Calculus III.

Best,

Neil

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Date: Sat, 02 Apr 2016 07:39:16 -0400

From: "Roman Kezerashvili" <rkezerashvili@CityTech.Cuny.Edu>

To: "Neil Katz" <NKatz@CityTech.Cuny.Edu>

Cc: "Giovanni Ossola" <GOssola@CityTech.Cuny.Edu>

Subject: Re: mathematics minor curruiculum change

Hi Nell,

From my point of view student should take linear algebra after they

took calculus 1. Therefore, the proposed change sounds educationally

OK.

Thank you,

Roman

Roman Kezerashvili, Ph.D., D.Sc.

Professor of Physics

Chairman of Physics Department

City Tech and Graduate Center

The City University of New York

Director of the Center for Theoretical Physics at City Tech

300 Jay Street

Brooklyn NY, 11201

Phone: 718 260 5277

Email:rkezerashvili@citytech.cuny.edu

>>> Neil Katz 4/1/2016 4:34 PM >>>

Dear Roman,

The mathematics department is proposing to add a pre-/co-requisite of

MAT 2580 (linear algebra) to MAT 2675 (calculus III).

The reasons for this are that some linear algebra is necessary to learn

multivariable calculus, and the way it is typically covered in calculus

textbooks is very different from the way it is covered in MAT2580, and

is more difficult for students to grasp. So MAT2675 will be a more

successful course, and can cover more material if we rely on MAT2580 to

cover material on vectors.

For applied mathematics majors MAT2580 and MAT2580 are required

courses, and the same is true for the proposed program in computational

physics, the only other program in the college to require MAT2675.

I'm writing to you as part of the consultation process for the

curriculum change.

Best,

Neil

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Date: Mon, 04 Apr 2016 00:03:51 -0400

From: "Laina Karthikeyan" <lkarthikeyan@CityTech.Cuny.Edu>

To: "Neil Katz" <NKatz@CityTech.Cuny.Edu>

Cc: "Joanne Weinreb" <JWeinreb@CityTech.Cuny.Edu>

Subject: Re: mathematics minor curruiculum change

\*\* High Priority \*\*

Dear Neil,

Thanks for informing us of the pre-/co-requisite change that you are

proposing for MAT 2675, which is an elective course for the BIB

program. I have cc'ed Prof. Joanne Weinreb, who is the Coordinator of

the BIB program on this e-mail so that she is aware of this. Thanks!

Best,

Laina

Laina Karthikeyan, Ph.D.

Associate Professor and Chair of Biological Sciences Department

New York City College of Technology

The City University of New York (CUNY)

Brooklyn, NY 11201

LKarthikeyan@citytech.cuny.edu718-260-5088

>>> Neil Katz 04/01/16 3:13 PM >>>

Dear Laina,

The mathematics department is proposing to add a pre-/co-requisite of

MAT 2580 (linear algebra) to MAT 2675 (calculus III).

The reasons for this are that some linear algebra is necessary to learn

multivariable calculus, and the way it is typically covered in calculus

textbooks is very different from the way it is covered in MAT2580, and

is more difficult for students to grasp. So MAT2675 will be a more

successful course, and can cover more material if we rely on MAT2580 to

cover material on vectors.

For applied mathematics majors MAT2580 is a required course, and it is

the only program in the college to require MAT2675.

I'm writing to you as part of the consultation process required for

curriculum changes because, while your programs do not require MAT2675,

both it and MAT2580 are elective courses.

Best,

Neil

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Date: Tue, 05 Apr 2016 12:11:42 -0400

From: "Hong Li" <HLi@CityTech.Cuny.Edu>

To: "Neil Katz" <NKatz@CityTech.Cuny.Edu>

Subject: Re: mathematics minor curruiculum change

We understand and agree the rationale to add the proposed pre-req,

although it does not affect CST students as you mentioned.

The MAT2675 is not part of CST curriculum requirement, therefore, it

will not affect us.

Thanks for sharing your curriculum changes.

-Hong

Hong Li, PH.D.

Chair and Associate Professor

Department of Computer Systems Technology

New York City College of Technology

300 Jay Street N-914

Brooklyn, NY 11201

(718)260-5170

>>> Neil Katz 4/1/2016 3:29 PM >>>

Dear Hong,

The mathematics department is proposing to add a pre-/co-requisite of

MAT 2580 (linear algebra) to MAT 2675 (calculus III).

The reasons for this are that some linear algebra is necessary to learn

multivariable calculus, and the way it is typically covered in calculus

textbooks is very different from the way it is covered in MAT2580, and

is more difficult for students to grasp. So MAT2675 will be a more

successful course, and can cover more material if we rely on MAT2580 to

cover material on vectors.

I'm writing to you as part of the consultation process required for

curriculum changes because, while your programs do not require MAT2675,

some of your students take it anyway.

Best,

Neil

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From: "Diana Samaroo" <dsamaroo@CityTech.Cuny.Edu>

To: "Neil Katz" <NKatz@CityTech.Cuny.Edu>

Subject: Re: mathematics minor curruiculum change

Dear Neil,

After consulting with our curriculum committee, we support the addition

of MAT 2580 as a pre-/co-requisite to MAT 2675. We agreed that most

math departments require linear algebra before multivariable calculus.

All the best,

Diana

Diana SAMAROO, PhD

New York City College of Technology

300 Jay Street, Pearl 613

Brooklyn, NY 11201

email: dsamaroo@citytech.cuny.edu

main: 718.260.5850

Bachelor of Science in Applied Chemistry

>>> Neil Katz 04/01/16 3:15 PM >>>

Dear Diana,

The mathematics department is proposing to add a pre-/co-requisite of

MAT 2580 (linear algebra) to MAT 2675 (calculus III).

The reasons for this are that some linear algebra is necessary to learn

multivariable calculus, and the way it is typically covered in calculus

textbooks is very different from the way it is covered in MAT2580, and

is more difficult for students to grasp. So MAT2675 will be a more

successful course, and can cover more material if we rely on MAT2580 to

cover material on vectors.

For applied mathematics majors MAT2580 is a required course, and it is

the only program in the college to require MAT2675.

I'm writing to you as part of the consultation process required for

curriculum changes because, while your programs do not require MAT2675,

both it and MAT2580 are elective courses.

Best,

Neil

**AV: 1 Changes to be offered in the Mathematics Department**

|  |  |  |  |
| --- | --- | --- | --- |
| **CUNYFirst Course ID** | **039919** |  |  |
| **FROM** |  | **TO** |  |
| **Department(s)** |  | **Department(s)** |  |
| **Course** |  | **Course** |  |
| **Prerequisite** | **MAT 1575** | **Prerequisite** | **MAT 1575** |
| **Co-requisite**  | **-** | **Co-requisite**  | **-** |
| **Pre- or co-requisite**  | **-** | **Pre- or co-requisite**  | **MAT 2580** |
| **Hours** |  | **Hours** |  |
| **Credits** |  | **Credits** |  |
| **Description** | **~~A continuation of MAT 1575. Topics include polar and parametric equations, vectors, solid analytic geometry, partial derivatives, multiple integrals, vector fields, line integrals and Green's Theorem.~~** | **Description** | **A continuation of MAT 1575. Topics include parametric curves, partial derivatives, differentiable multi-variable functions, chain rule for multi-variable functions, vector fields, gradients, divergence, curl, Lagrange multipliers, multiple integrals, line integrals, Green's Theorem, and Stokes' Theorem.** |
| **Requirement Designation** |  | **Requirement Designation** |  |
| **Liberal Arts** | **[ ] Yes [ ] No**  | **Liberal Arts** | **[ ] Yes [ ] No**  |
| **Course Attribute (e.g. Writing Intensive, Honors, etc** |  | **Course Attribute (e.g. Writing Intensive, Honors, etc** |  |
| **Course Applicability** |

|  |  |
| --- | --- |
| **[ ] Major** |  |
| **[ ] Gen Ed Required** |
| **[ ] English Composition** |
| **[ ] Mathematics** |
| **[ ] Science** |
| **[ ] Gen Ed - Flexible** |
| **[ ] World Cultures** |
| **[ ] US Experience in its Diversity** |
| **[ ] Creative Expression** |
| **[ ] Individual and Society** |
| **[ ] Scientific World** |
| **[ ] Gen Ed - College Option** |
| **College Option Detail\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |

 | **Course Applicability** |

|  |  |
| --- | --- |
| **[ ] Major** |  |
| **[ ] Gen Ed Required** |
| **[ ] English Composition** |
| **[ ] Mathematics** |
| **[ ] Science** |
| **[ ] Gen Ed - Flexible** |
| **[ ] World Cultures** |
| **[ ] US Experience in its Diversity** |
| **[ ] Creative Expression** |
| **[ ] Individual and Society** |
| **[ ] Scientific World** |
| **[ ] Gen Ed - College Option** |
| **College Option Detail\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |

 |
| **Effective Term** |  |  | **Fall 2016** |

Rationale: **To give students a better grounding in multi-variable functions, in particular to introduce students to linear multi-variable functions, it is proposed to require linear algebra as a co-requisite or prerequisite to Calculus III. In this way the course can avoid treating vectors and determinants in a different way than in the linear algebra course, while at the same time reinforcing what is covered in that course. Removing introductory material on vectors from the course will also allow covering Stokes' Theorem, a standard topic for multi-variable calculus.**