# Department of Mathematics

**Curriculum Proposal**

**Extension and Modification of Experimental Corequisite Model to Increase Student Success and Accelerate Progress to Graduation**

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## 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 for information about what types of modifications are major or minor. Completed proposals should be emailed to the Curriculum Committee chair.**

|  |  |
| --- | --- |
| **Title of Proposal** | **The Corequisite Courses** |
| **Date** | **2/23/2018** |
| **Major or Minor** | **Major** |
| **Proposer’s Name** | **Sandie Han** |
| **Department** | **Mathematics** |
| **Date of Departmental Meeting in which proposal was approved** | **Original vote: 3/2/17, 9/7/2017, 3/1/2018** |
| **Department Chair Name** | **Sandie Han** |
| **Department Chair Signature and Date** | **2/23/2018** |
| **Academic Dean Name** | **Justin Vazquez‐Poritz** |
| **Academic Dean Signature and Date** | **2/23/18** |
| **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.** | As detailed below, to comply with a mandate from the CUNY Board of Trustees regarding movement from developmental to credit‐bearing mathematics courses, the Math Department is adjusting its sequence, with full implementation planned for Fall 2019. In preparation, the Math Department proposes to pilot three new non‐ credit corequisite math courses tentatively numbered MAT 1275CO, MAT 1190CO, and MAT 065CO during  summer 2018, fall 2018, and spring 2019.  **(1) MAT 1275CO College Algebra and Trigonometry corequisite**  MAT 1275CO will offer two additional hours of support for students meeting the eligibility for MAT 1175 to accelerate and take MAT 1275. This alternative to the MAT 1175/ MAT 1275 sequence allows students to advance from developmental math to precalculus in one semester.  **0 credit, 2 hours**  **Prerequisite:** CUNY Proficiency in Math. Students who took MAT 1190CO need department approval and must demonstrate proficiency in Elementary Algebra.  **Corequisite**: MAT 1275 |

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| --- | --- |
|  | 1. **MAT 1190CO Quantitative Reasoning Corequisite**   The course MAT 1190CO will offer two additional hours of support for students meeting the eligibility for MAT 065 and majoring in non‐STEM disciplines to accelerate and take MAT 1190. This option provides an alternative to Elementary Algebra (MAT 065) and allows students in non‐STEM disciplines to complete the credit level course MAT 1190, Quantitative Reasoning while receiving supplemental math instruction.  **0 credit, 2 hours**  **Prerequisite:** Meet the CUNY Math Placement for Elementary Algebra (A score of 40‐56 on ACCUPLACER Elementary Algebra test). CUNY proficiency in reading. This course is offered to students in qualified Non‐STEM majors only.  **Corequisite**: MAT 1190   1. **MAT 065CO Elementary Algebra Corequisite** MAT 065CO will offer two additional hours of support for students scoring 39 or less on the ACCUPLACER Elementary Algebra Test. The corequisite sessions will focus on active learning, and problem‐solving at an individualized pace.   **0 credit, 2 hours**  **Prerequisite**: Meet the CUNY Math Placement for Arithmetic (ACCUPLACER Elementary Algebra score of 39 or less).  **Corequisite**: MAT 065 |

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| **Brief Rationale for** | Per a Board of Trustees resolution, CUNY Math  Departments are required to offer some students who  are placed in the upper level of developmental Math, the opportunity to take a credit‐bearing math course with non‐credit corequisite support. Campus Math  Departments have discretion regarding the placement criteria, structure of their sequences, and the format of the non‐credit support offered. The City Tech Math Department, in consultation with the Math Discipline Council and CUNY Academic Affairs/ OIRA, has determined placement criteria and has been working on the instructional design for the non‐credit corequisites.  **See Appendix:** Plan for Implementation of Revised  Mathematics Sequences Submitted to CUNY OAA,  February 6, 2017; updated, March 17, 2017.  The proposed accelerated math sequence addresses  several issues including (1) financial aid; (2) time to  graduation; (3) hidden prerequisites; (4) needs for  developmental math intervention. |
| **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).** |
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| **Proposal History** | A proposal was originally submitted on 3/2/2017 to  pilot MAT 1275EN and MAT 1190EN, which added 2  hours of no credit supplemental instruction/support to  existing courses MAT 1275 and MAT 1190,  respectively. Following successful piloting in summer  and fall 2017, the department proposes to continue the  development process, but to configure the changes  differently. Instead of proposing variants of existing  courses, the department will retain the current courses  and: 1) propose the approval of non‐credit corequisite  courses for students who qualify and 2) amend the  prerequisites of the current courses affected. |
| **(Please provide history of** |
| **this proposal: is this a** |
| **resubmission? An updated** |
| **version? This may most** |
| **easily be expressed as a** |
| **list).** |
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**CURRENT MATH SEQUENCE**

MAT 1475

Calculus 4 cr 4 hrs

STEM

Track

MAT 1375

Precalculus 4 cr 4 hrs

Non‐ STEM

Track

CUNY Math Proficiency

MAT 1275

College Algebra and Trigonometry 4 cr 4 hrs

MAT 1272

3 credits 3 hours

MAT 1175

Intermediate Algebra and Geometry 4 cr 4 hrs

MAT 1190

3 cr 3 hrs

MAT 063

Elementary Algebra 0 cr 7 hrs

MAT 065

Elementary Algebra 0 cr 5 hrs

MAT 1375

Precalculus

4 cr 4 hrs

MAT 1275

College Algebra and Trigonometry

4 cr 4 hrs

MAT 1475

Calculus

4 cr 4 hrs

CUNY Math Proficiency

***OR*** Math Department Placement

MAT 1275CO

0 cr 2 hrs

MAT 065CO

0 cr 2 hrs

MAT 1272

3 credits 3 hours

Non-STEM Majors

MAT 1190

3 cr 3 hrs

MAT 1190CO

0 cr 2 hrs

STEM

Track

MAT 065

Elementary Algebra

0 cr 5 hrs

Non-STEM

Track

New York City College of Technology, CUNY NEW COURSE PROPOSAL FORM

This form is used for all new course proposals. Attach this to the Curriculum Modification Proposal Form and submit as one package as per instructions. Use one New Course Proposal Form for each new course.

|  |  |
| --- | --- |
| **Course Title** | College Algebra and Trigonometry Corequisite |
| **Proposal Date** | 2/20/2018 |
| **Proposer’s Name** | Sandie Han |
| **Course Number** | MAT 1275CO |
| **Course Credits, Hours** | 0 credit, 2 hours |
| **Course Pre / Corequisites** | **Prerequisite:** CUNY Proficiency in Math. Students who took MAT 1190CO need department approval and must demonstrate proficiency in Elementary Algebra.  **Corequisite**: MAT 1275 |
| **Catalog Course Description** | Guided hands‐on problem‐solving and practice for students in MAT 1275. Topics include quadratic equations, the distance and midpoint formula, graphing parabolas and circles, systems of linear and quadratic equations, an introduction to exponential and logarithmic functions. Topics from trigonometry include basic trigonometric functions, identities, equations and solutions of triangles. |
| **Brief Rationale**  Provide a concise summary of why this course is important to the department, school or college. | To provide an accelerated track for students to enroll in college algebra and trigonometry after passing MAT 065 and to provide support for student success in the course. |
| **CUNY – Course Equivalencies** Provide information about equivalent courses within CUNY, if any. | All CUNY associate‐degree granting colleges are required to offer eligible students gateway credit‐ bearing math courses with a non‐credit corequisite. |
| **Intent to Submit as Common Core**  If this course is intended to fulfill one of the requirements in the common core, then indicate which area. | No |
| **For Interdisciplinary Courses:**   * Date submitted to ID Committee for review * Date ID recommendation received   - Will all sections be offered as ID? Y/N | No |
|  |
|  |
| **Intent to Submit as a Writing Intensive Course** | No |

## NEW COURSE PROPOSAL CHECK LIST

Use this checklist to ensure that all required documentation has been included. You may wish to use this checklist as a table of contents within the new course proposal.

|  |  |
| --- | --- |
| **Completed NEW COURSE PROPOSAL FORM** |  |
| * Title, Number, Credits, Hours, Catalog course description | x |
| * Brief Rationale | x |
| * CUNY – Course Equivalencies |  |
| Completed Library Resources and Information Literacy Form |  |
| **Course Outline**  Include within the outline the following. |  |
| Hours and Credits for Lecture and Labs  If hours exceed mandated Carnegie Hours, then rationale for this | x |
| Prerequisites/Co‐ requisites | x |
| Detailed Course Description | x |
| Course Specific Learning Outcome and Assessment Tables   * Discipline Specific * General Education Specific Learning Outcome and Assessment Tables | x |
| Example Weekly Course outline | x |
| Grade Policy and Procedure | x |
| Recommended Instructional Materials (Textbooks, lab supplies, etc) | x |
| Library resources and bibliography |  |
| **Course Need Assessment.**  Describe the need for this course. Include in your statement the following information. |  |
| Target Students who will take this course. Which programs or departments, and how many anticipated?  Documentation of student views (if applicable, e.g. non‐required elective). | x |
| Projected headcounts (fall/spring and day/evening) for each new or modified course. | x |
| If additional physical resources are required (new space, modifications, equipment), description of these requirements. If applicable, Memo or email from the VP for Finance and Administration with written comments regarding additional and/or new facilities, renovations or construction. | n/a |
| Where does this course overlap with other courses, both within and outside of the department? |  |
| Does the Department currently have full time faculty qualified to teach this course? If not, then what plans are there to cover this? | x |
| If needs assessment states that this course is required by an accrediting body, then provide documentation indicating that need. | n/a |

|  |  |
| --- | --- |
| **Course Design**  Describe how this course is designed. |  |
| Course Context (e.g. required, elective, capstone) | x |
| Course Structure: how the course will be offered (e.g. lecture, seminar, tutorial, fieldtrip)? | x |
| Anticipated pedagogical strategies and instructional design (e.g. Group Work, Case Study, Team Project, Lecture) | x |
| How does this course support Programmatic Learning Outcomes? | x |
| Is this course designed to be partially or fully online? If so, describe how this benefits students and/or program. | n/a |
| **Additional Forms for Specific Course Categories** |  |
| Interdisciplinary Form (if applicable) | n/a |
| Interdisciplinary Committee Recommendation (if applicable and if received)\*  \*Recommendation must be received before consideration by full Curriculum Committee | n/a |
| Common Core (Liberal Arts) Intent to Submit (if applicable) | n/a |
| Writing Intensive Form if course is intended to be a WIC (under development) | n/a |
| If course originated as an experimental course, then results of evaluation plan as developed with director of assessment. | n/a |
| **(Additional materials for Curricular Experiments)** |  |
| Plan and process for evaluation developed in consultation with the director of assessment. (Contact Director of Assessment for more information). |  |
| Established Timeline for Curricular Experiment | x |

## Chancellor’s Report Information New Course

**New courses to be offered in the mathematics department**

|  |  |
| --- | --- |
| **Department(s)** | Mathematics |
| **Academic Level** | **[X ] Regular [ ] Compensatory [ ] Developmental [ ] Remedial** |
| **Subject Area** | Mathematics |
| **Course Prefix** | MAT |
| **Course Number** | 1275CO |
| **Course Title** | College Algebra and Trigonometry Corequisite |
| **Catalog Description** | Guided hands‐on problem‐solving and practice for students in MAT 1275. Topics include quadratic equations, the distance and midpoint formula, graphing parabolas and circles, systems of linear and quadratic equations, an introduction to exponential and logarithmic functions. Topics from trigonometry include basic trigonometric functions, identities, equations and solutions of triangles. |
| **Prerequisite** | CUNY Proficiency in Math. Students who took MAT 1190CO need department approval and must demonstrate proficiency in Elementary Algebra. |
| **Corequisite** | MAT 1275 |
| **Pre‐ or corequisite** | None |
| **Credits** | 0 credit |
| **Contact Hours** | 2 hours |
| **Liberal Arts** | **[ X ] Yes [ ] No** |
| **Course Attribute (e.g. Writing Intensive, etc)** |  |
| **Course Applicability** | **[ ] Major**  **[ ] Gen Ed Required [ ] Gen Ed ‐ Flexible [ ] Gen Ed ‐ College**  **Option**  **[ ] English [ ] World Cultures [ ] Speech Composition**  **[ X ] Mathematics [ ] US Experience in its [ ] Interdisciplinary**  **Diversity**  **[ ] Science [ ] Creative Expression [ ] Advanced Liber**  **Arts**  **[ ] Individual and Society [ ] Scientific World** |
| **Effective Term** | Summer 2018 |

**Rationale:** To provide an accelerated track for students to enroll in college algebra and trigonometry after passing MAT 065 and to provide support for student success in the course.

## LIBRARY RESOURCES & INFORMATION LITERACY: MAJOR CURRICULUM MODIFICATION

Please complete for **all** major curriculum modifications. This information will assist the library in planning for new courses/programs.

Consult with your library faculty subject specialist (<http://cityte.ch/dir)> **3 weeks before the proposal deadline**.

**Course proposer:** please complete boxes 1‐4. **Library faculty subject specialist:** please complete box 5.

## 1

|  |  |
| --- | --- |
| **Title of proposal**  **New Course: MAT 1275CO**  **College Algebra and Trigonometry Corequisite** | **Department/Program Mathematics** |
| **Proposed by** (include email & phone)  Sandie Han [shan@citytech.cuny.edu](mailto:shan@citytech.cuny.edu) 718‐260‐5380 | **Expected date course(s) will be offered**  Fall 2018 and onward  **# of students: 1000 students per semester** |

## 2

**The library cannot purchase reserve textbooks for every course at the college, nor copies for all students. Consult our website (**[**http://cityte.ch/curriculum)**](http://cityte.ch/curriculum)) **for articles and ebooks for your courses, or our open educational resources (OER) guide (**[**http://cityte.ch/oer).**](http://cityte.ch/oer)) **Have you considered using a freely‐available OER or an open textbook in this course?**

Although the current textbook is not open source, we do supplement the textbook with WeBWorK and other OER instructional materials made available to the instructors.

There is also a math faculty who is planning to write a MAT 1275 open textbook. We will also consider other resources and OER.

## 3

**Beyond the required course materials, are City Tech library resources sufficient for course assignments? If additional resources are needed, please provide format details (e.g. ebook, journal, DVD, etc.), full citation (author, title, publisher, edition, date), price, and product link.**

The current library resources are sufficient for the new course. Any required textbook will be ordered through the book store. Multiple copies of the textbook will be obtained by the math department and placed in the library as resources on loan to the students.

## 4

**Library faculty focus on strengthening students' information literacy skills in finding, critically evaluating, and ethically using information. We collaborate on developing assignments and customized instruction and research guides. When this course is offered, how do you plan to consult with the library faculty subject specialist for your area? Please elaborate.**

The communication and consultation will center around developing the new OER textbook.



**Library Faculty Subject Specialist: (Cailean Cooney, Assistant Professor)**

**Comments and Recommendations:** Zero‐cost open textbooks and course materials would be extremely valuable to students moving from developmental to credit‐bearing mathematics courses. In addition to ensuring that students have access to the course material, OERs particularly benefit students in course sequences and remediation by providing reliable access for students to revisit concepts and test their knowledge independently and at the advisement of instructors. Prof. Cooney will keep the Math Department informed of potential funding opportunities to develop OERs and will provide a list of existing OERs to review for adoption and / or modification.

The Library provides resources relevant to the course topic, available both on‐site and online, including print and electronic books, and journal subscriptions. Print books from other CUNY campuses are also available to request. The Library will consider additional resource requests based on budgetary means.

**Date:** 2/26/18

**NEW YORK CITY COLLEGE OF TECHNOLOGY The City**

**University of New York**

**DEPARTMENT:** Mathematics

**COURSE:** MAT 1275CO

**TITLE:** College Algebra and Trigonometry Corequisite

**DESCRIPTION:** Guided hands‐on problem‐solving and practice for students in MAT 1275. Topics include quadratic equations, the distance and midpoint formula, graphing parabolas and circles, systems of linear and quadratic equations, an introduction to exponential and logarithmic functions. Topics from trigonometry include basic trigonometric functions, identities, equations and solutions of triangles.

**TEXT:** Custom Text by McGraw-Hill containing material from Intermediate Algebra, 3rd edition by Julie Miller, Molly O’Neill, and Nancy Hyde and Trigonometry, 2nd edition by John Coburn

**CREDITS**: 0 credit, 2 hours

**PREREQUISITES:** CUNY Proficiency in Math. Students who took MAT 1190CO need department approval and must demonstrate proficiency in Elementary Algebra.

**COREQUISITE:** MAT 1275

Prepared by:

K. Andrew Parker Spring 2017

A scientific calculator is required.

Students are expected to attend all sessions and actively participate in all classwork activities.

## Course Intended Learning Outcomes/Assessment Methods

|  |  |
| --- | --- |
| **Learning Outcomes** | **Assessment Methods** |
| **1.** Students will be able to implement a variety of methods for solving problems involving linear equations in two or more variables. | Classroom activities and discussion, group work, homework, WeBWorK, quizzes.  Also assessed on exams in MAT1275. |
| **2.** Students will be able to implement a variety of methods for solving problems involving quadratic equations in one or two variables. | Classroom activities and discussion, group work, homework, WeBWorK, quizzes.  Also assessed on exams in MAT1275. |
| **3.** Students will be able to simplify and manipulate expressions involving roots with varying indices, both as expressions and within the broader context of solving equations. | Classroom activities and discussion, group work, homework, WeBWorK, quizzes.  Also assessed on exams in MAT1275. |
| **4.** Students will be able to simplify and manipulate rational expressions in multiple variables, both as expressions and within the broader context of solving equations. | Classroom activities and discussion, group work, homework, WeBWorK, quizzes.  Also assessed on exams in MAT1275. |
| **5.** Students will be able to analyze equations and their solutions in order to identify the existence of extraneous solutions. | Classroom activities and discussion, group work, homework, WeBWorK, quizzes.  Also assessed on exams in MAT1275. |
| **6.** Students will be able to recall the trigonometric ratios, and apply them in the measurement of missing sides and angles of both right and non‐right triangles. | Classroom activities and discussion, group work, homework, WeBWorK, quizzes.  Also assessed on exams in MAT1275. |
| **7.** Students will be able to translate between various logarithmic and exponential representations of a given equation. | Classroom activities and discussion, group work, homework, WeBWorK, quizzes.  Also assessed on exams in MAT1275. |

**General Education Learning Outcomes/Assessment Methods**

|  |  |
| --- | --- |
| **Learning Outcomes** | **Assessment Methods** |
| **1.** Understand and employ both quantitative and qualitative analysis to solve problems. | Classroom activities and discussion, group work, homework or WeBWorK, |
| **2.** Employ scientific reasoning and logical thinking. | Classroom activities and discussion, group work, homework or WeBWorK, |
| **3.** Communicate effectively using written and oral means. | Classroom activities and discussion, group work, reading and writing |
| **4.** Use creativity to solve problems. | Classroom activities and group discussion, group work, homework or WeBWorK, open educational resources. |

**New York City College of Technology Policy on Academic Integrity**

Students and all others who work with information, ideas, texts, images, music, inventions, and other intellectual property owe their audience and sources accuracy and honesty in using, crediting, and citing sources. As a community of intellectual and professional workers, the College recognizes its responsibility for providing instruction in information literacy and academic integrity, offering models of good practice, and responding vigilantly and appropriately to infractions of academic integrity. Accordingly, academic dishonesty is prohibited in The City University of New York and at New York City College of Technology and is punishable by penalties, including failing grades, suspension, and expulsion. The complete text of the College policy on Academic Integrity may be found in the catalog.

Grading rubrics:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Letter Grade** | A | A- | B+ | B | B- | C+ | C | D | F |
| **Numerical Grade** | 93-100 | 90-92.9 | 87-89.9 | 83-86.9 | 80-82.9 | 77-79.9 | 70-76.9 | 60-69.9 | <=59.9 |

## MAT 1275CO College Algebra and Trigonometry Corequisite

**Text: McGraw‐Hill Custom Textbook containing material from Intermediate Algebra, 5th ed., by Miller, O'Neill, and Hyde and Trigonometry, 2nd ed., by Coburn (sessions 22‐33).**

|  |  |  |
| --- | --- | --- |
|  | **TOPICS** | Activity |
| **1** | **Linear Relationships**   * Develop intuition about the geometric qualities of a line based on the equation. * Constructing an equation from the given geometric qualities. | WeBWorK Problem Sets:   * LineLab * LinesReview * GraphingLines |
| **2** | **Systems of Linear Equations**   * Visual representation * Substitution * Elimination | WeBWorK Problem Sets:   * LinearSystems * 3x3‐Systems |
| **3** | **Quadratic Manipulation**   * Full AC‐method via grouping * Completing the square for non‐factorable equations | WeBWorK Problem Sets:   * AC‐Method * SquareRootProperty |
| **4** | **Parabolas and Their Equations**   * Constructing an equation based on given roots and/or vertex * Manipulating an equation to determine the vertex | WeBWorK Problem Sets:   * ParabolaLab * ParabolaVertices‐CtS * ParabolaVertices‐Formula |
| **5** | **Circles**   * Constructing an equation based on a center and radius * Manipulating an equation to determine center and radius | WeBWorK Problem Sets:   * CircleLab * Circles |
| **6** | **Manipulating Roots**   * Understanding roots as a question: “What number has *this* as its nth power?” * Discovering unintended consequences of simplifying even‐indexed radicals | WeBWorK Problem Sets:   * HigherRoots * SimplifyRadicals |
| **7** | **Dealing with Radical Equations**   * Discovering unintended consequences of squaring both sides of an equation | WeBWorK Problem Sets:   * RadicalEquations |

|  |  |  |
| --- | --- | --- |
| **8** | **Algebraic Fractions**   * Practice with fractions | WeBWorK Problem Sets:   * RationalExpressions1 * RationalExpressions2 |
| **9** | **Nested Fractions**   * Invert‐and‐multiply strategy * Clear denominators strategy | WeBWorK Problem Sets:   * ComplexFractions‐Method1 * ComplexFractions‐Method2 |
| **1**  **0** | **Similarity and the Foundation of Trigonometric Ratios**   * Using similar shapes to understand common ratios * Practice identifying legs as opposite and adjacent to a specific angle | WeBWorK Problem Sets:   * SpecialTriangles * TrigRatios |
| **1**  **1** | **The Unit Circle**   * Practice angles in radians and the symmetries of the unit circle * Identify multiple angles with the same trig ratio | WeBWorK Problem Sets:   * UnitCircle * TrigEquations |
| **1**  **2** | **Solving Non‐Right Triangles**   * Use Law of Sines for ASA * Explore ambiguous case * Use Law of Cosines for SAS or SSS * Emphasize compounded rounding errors | WeBWorK Problem Sets:   * LawOfSines * LawOfCosines |
| **1**  **3** | **Applications of Exponential Equations**   * Compounding interest and one way to “discover” *e* * Approximating logarithms using the Change of Base formula | WeBWorK Problem Sets:   * CompoundInterest * ExponentialEquations‐Calc |
| **1**  **4** | **Manipulating Logarithms**   * Translate between exponential and logarithmic equations * Practice manipulating logarithmic expressions | WeBWorK Problem Sets:   * LogarithmicFunctions * LogarithmicProperties |
| **1**  **5** | **Final Exam Review** | **Departmental Final Exam Review Sheet** |

**Needs Assessment:**

Note 2/20/18: This proposal was originally submitted on 3/2/2017 to pilot MAT 1275EN, and MAT 1190EN, as curricular experiments. Following successful piloting in summer and fall 2017, described below, the department proposes to continue the development process but to adjust the configuration originally proposed. Instead of proposing variants of MAT 1275, MAT 1190, and MAT 065, the department will retain the current courses and 1) propose the approval of non‐credit corequisite courses for students who qualify and 2) amend the prerequisites of the current courses affected to include the corequisites for students who qualify. The rationale, content, and total number of hours remain as originally proposed. Instead of offering MAT 1275 (4 hrs, 4 credits) and MAT 1275EN (6 hrs., 4 credits), the department proposes to enroll all of the students in MAT 1275 but require students with lower scores to register for sections linked to the non‐credit corequisite, MAT1275CO (2 hrs, 0 credits). The change was made principally to avoid financial aid problems for students who need to repeat the credit course because the F/D repeat policy applies only to the same course number, which the EN suffix rendered impossible.

MAT1175 no longer qualifies for TAP funding; therefore, the department must adapt our STEM‐pipeline structure to both support students’ mathematical development and also prevent potential difficulties for students receiving financial aid. In addition, the newly proposed MAT 1275+MAT 1275CO structure will facilitate in the transferability of the MAT 1275 College Algebra and Trigonometry to other institutions.

With the support of the corequisite, we aim to move students directly from MAT065 into MAT1275. This model will allow students who would otherwise have placed into MAT1175 to enter MAT 1275 and be ready for MAT 1375 precalculus in one semester.

## Course Design:

Because students are essentially skipping the formerly‐prerequisite MAT1175 course, it is important that we review and/or cover several intermediary concepts as a bridge to competency on the standard MAT1275 learning outcomes. We have identified two major areas: lines and linear systems, and fundamentals of quadratics as topics that merit 4 additional sessions beyond the standard MAT1275 curriculum.

Additionally, several other topics in the existing MAT1275 curriculum were originally introduced in MAT1175 – with the major difference being a deeper level of complexity in 1275 as compared to the introductory nature of MAT1175. As a result, students participating in the experiment will be building their understanding of these topics from scratch and they will be expected to reach the level of complexity expected from the standard 1275 students. Another 10 classroom sessions are devoted to additional problem‐ solving on these expanded topics.

Also, because these students are starting from a more introductory level, they will likely need to move through the MAT1275 material at a slower pace, with more problem‐solving practice. As a result, we are proposing this additional corequisite course, providing more

classroom hours during the semester. Furthermore, the additional two hours of class time are intended to provide students with an active learning experience.

## Course Structure:

Our plan is to structure the MAT 1275+corequisite to meet three times a week, instead of twice a week for the regular MAT 1275. This extra meeting will be used to address topics currently covered in MAT1175 and to provide additional problem‐solving practice.

## Pedagogical Strategies and Instructional Design:

Instructors participating in the experimental sections will be encouraged to attempt different active learning strategies made possible by the additional classroom hours provided by the corequisite MAT1275CO.

The additional time will be necessary for identifying the major learning gaps students bring with them, along with interventional instruction in the identified topics. Specific techniques for this additional instruction will vary between instructors and likely even between topics. Instructors participating in the experiment will receive training in a variety of active learning strategies, and it is expected that the additional instruction will make use of some of the following:

* Real‐world applications
* Inquiry‐based learning
* Guided discovery
* Interactive classroom technology
* Open educational resources such as WeBWorK, instructional videos, other homework management system, etc.

## Plan and Process for Evaluation:

Because 1275CO is a corequisite to MAT1275, students will take the same final exam as the standard MAT1275 sections. By using a scoring guide to aid in a standardized evaluation process, we will collect item‐level data on final exams from all students in MAT1275 in order to assess student learning outcomes. Comparisons will be made between students taking only MAT1275 and those who take it with the corequisite MAT1275CO. Item level data will also aid in identifying specific topics where 1275CO instructors will want to focus extra attention in order to ensure that 1275CO students are as ready to progress as their 1275 peers.

Beyond overall pass rates and final exam data, we will also be tracking student performance in the subsequent MAT1375 course. We want to be sure that, more than simply passing the course, students are prepared for success in their next math class. To that extent, we will be comparing the MAT1375 pass rates of successful MAT1275CO students to the pass rates of successful MAT1275 students.

## Summer 2017 Pilot Data

In summer 2017, two sections of MAT 1275EN were offered. The students were incoming freshmen. There were 34 students in each section for a total of 68 students. When comparing the grade distribution of MAT 1275EN with MAT 1275 in the summer 2017 sections, the standard MAT1275 sections seemed to perform significantly better (based on grade distribution) than the MAT 1275EN sections. There are many factors which can contribute to the differences: different instructors with different teaching practices, freshman students versus continuing students, different prior mathematics backgrounds and experiences. Furthermore, it should be noted that MAT 1275EN had larger class sizes than the MAT1275 summer sections. The summer MAT 1275EN had 34 students per section, whereas the MAT1275 had class sizes in the range of 13 – 28, with an average of

* 1. students per section.

**A Comparison of the Grade Distribution of MAT 1275EN with**

**MAT 1275 summer 2017**

MAT 1275EN summer 2017

MAT 1275 summer 2017

82.9

66.2

68.3

54.4

20.6

12.2

13.2

4.9

%D or better

%C or better

% F

% W/WU

However, the grade distribution of the MAT 1275EN summer sections is comparable with the grade distribution of the MAT1275 sections offered during the spring and fall semesters. See table and chart below.

This data is significant in showing that students who would have normally been placed into MAT 1175, are capable of bridging the gap of MAT 1175 and successfully completing the MAT 1275 course work in MAT 1275EN.

|  |  |  |  |
| --- | --- | --- | --- |
|  | MAT 1275EN  summer 2017 (N=68) | MAT 1275 Fall  2016 institutional data (N=1274) | MAT 1275 Spring 2016 institutional data (N=1019) |

|  |  |  |  |
| --- | --- | --- | --- |
| %D or better | 66.2 | 65.5 | 64.7 |
| %C or better | 54.4 | 52.9 | 50.1 |
| % F | 20.6 | 18.4 | 17.3 |
| % W/WU | 13.2 | 16.1 | 17.6 |

**A Comparison of the Grade Distribution of Summer 2017 MAT 1275EN**

**with the Spring and Fall MAT 1275**

MAT 1275EN summer 2017 (N=68)

MAT 1275 Fall 2016 institutional data (N=1274) MAT 1275 Spring 2016 institutional data (N=1019)

70.0

66.2

65.5

64.7

60.0

54.4

52.9

50.1

50.0

40.0

30.0

20.6

20.0

18.4

17.3

17.6

13.2

16.1

10.0

0.0

%D or better

%C or better

% F

% W/WU

## Fall 2017 Pilot Data

In the fall semester of 2017, four sections of MAT1275EN were offered. All 1275EN students were incoming freshmen. There were initially 39 students in each section for a total of 155 students. When comparing the grade distribution of MAT1275EN with MAT1275 in the fall 2017 sections, the MAT1275EN sections had higher frequencies of A’s and B’s (see grade distribution chart below) than the standard MAT1275 sections. Overall, the MAT1275EN results were again on‐par with the historical results from the standard MAT1275 sections in terms of “C or better”, “D or better”, “F” and “W/WU” aggregate measures.

Course Grades F17

25

20

15

10

5

0

A

A‐

B+

B B‐

C+

C

D

F W/WU

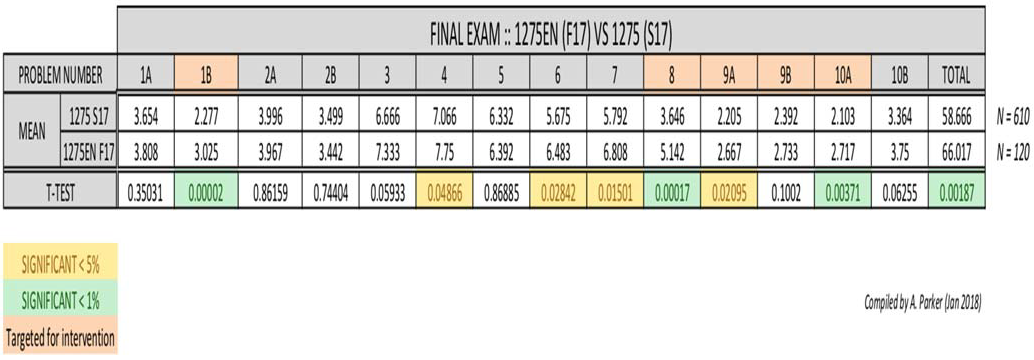
1275EN 1275

*A comparison of individual course grades for Fall 2017.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | MAT 1275EN  Fall 2017 (N=155) | MAT 1275  Fall 2017 institutional data (N=?) | MAT 1275  Spring 2016 institutional data (N=1019) | MAT 1275  Fall 2016 institutional data (N=1274) |
| %D or better | 63.9 | 67.3 | 64.7 | 65.5 |
| %C or better | 55.5 | 54.1 | 50.1 | 52.9 |
| % F | 15.5 | 16.8 | 17.3 | 18.4 |
| % W/WU | 20.6 | 15.9 | 17.6 | 16.1 |

*Aggregate course grades for Fall 2017*

Furthermore, item‐level final exam data was collected for the fall 2017 sections of MAT1275EN, and in a comparison with aggregated historical data for standard sections of MAT1275, the 1275EN sections showed statistically significant improvement on seven of the 14 final exam problems (see final exam chart below). Even more significantly, the 1275EN sections showed improvement on four of the five problems previously identified by the assessment committee as targets for intervention.



*An item‐level comparison of Final Exam results for MAT1275EN vs. historical MAT1275 data.*

New York City College of Technology, CUNY NEW COURSE PROPOSAL FORM

This form is used for all new course proposals. Attach this to the Curriculum Modification Proposal Form and submit as one package as per instructions. Use one New Course Proposal Form for each new course.

|  |  |
| --- | --- |
| **Course Title** | Quantitative Reasoning Corequisite |
| **Proposal Date** | 2/20/2018 |
| **Proposer’s Name** | Sandie Han |
| **Course Number** | MAT 1190CO |
| **Course Credits, Hours** | 0 credit, 2 hours |
| **Course Pre / Corequisites** | **Prerequisite:** Meet the CUNY Math Placement for Elementary Algebra (A score of 40‐56 on ACCUPLACER Elementary Algebra test). CUNY proficiency in reading. This course must be taken with the corequisite MAT 1190CO and is offered to students in qualified Non‐STEM majors only.  **Corequisite**: MAT 1190 |
| **Catalog Course Description** | Guided hands‐on problem‐solving and practice for students in MAT 1190 to develop and apply mathematical, logical, critical thinking, and statistical skills to solve problems in real-world contexts. Students acquire skills in the fields of algebra, geometry, probability, statistics, and mathematical modeling. The course incorporates opportunities within the classroom to develop students’ reading, writing, oral, and listening skills in a mathematical context. |
| **Brief Rationale**  Provide a concise summary of why this course is important to the department, school or college. | **To support student success in an alternative to elementary algebra track for non‐STEM majors.** |
| **CUNY – Course Equivalencies** Provide information about equivalent courses within CUNY, if any. |  |
| **Intent to Submit as Common Core**  If this course is intended to fulfill one of the requirements in the common core, then indicate which area. | No |
| **For Interdisciplinary Courses:**  **-** Date submitted to ID Committee for review | No |
|  |

|  |  |
| --- | --- |
| **-** Date ID recommendation received  - Will all sections be offered as ID? Y/N |  |
| **Intent to Submit as a Writing Intensive Course** | No |

## Summary NEW COURSE PROPOSAL CHECK LIST

Use this checklist to ensure that all required documentation has been included. You may wish to use this checklist as a table of contents within the new course proposal.

|  |  |
| --- | --- |
| **Completed NEW COURSE PROPOSAL FORM** |  |
| * Title, Number, Credits, Hours, Catalog course description | x |
| * Brief Rationale | x |
| * CUNY – Course Equivalencies |  |
| Completed Library Resources and Information Literacy Form |  |
| **Course Outline**  Include within the outline the following. |  |
| Hours and Credits for Lecture and Labs  If hours exceed mandated Carnegie Hours, then rationale for this | x |
| Prerequisites/Co‐ requisites | x |
| Detailed Course Description | x |
| Course Specific Learning Outcome and Assessment Tables   * Discipline Specific * General Education Specific Learning Outcome and Assessment Tables | x |
| Example Weekly Course outline | x |
| Grade Policy and Procedure | x |
| Recommended Instructional Materials (Textbooks, lab supplies, etc) | x |
| Library resources and bibliography |  |
| **Course Need Assessment.**  Describe the need for this course. Include in your statement the following information. |  |
| Target Students who will take this course. Which programs or departments, and how many anticipated?  Documentation of student views (if applicable, e.g. non‐required elective). | x |
| Projected headcounts (fall/spring and day/evening) for each new or modified course. | x |
| If additional physical resources are required (new space, modifications, equipment), description of these requirements. If applicable, Memo or email from the VP for Finance and Administration with written comments regarding additional and/or new facilities, renovations or construction. | n/a |
| Where does this course overlap with other courses, both within and outside of the department? | x |
| Does the Department currently have full time faculty qualified to teach | x |

|  |  |
| --- | --- |
| this course? If not, then what plans are there to cover this? |  |
| If needs assessment states that this course is required by an accrediting body, then provide documentation indicating that need. | n/a |
| **Course Design**  Describe how this course is designed. |  |
| Course Context (e.g. required, elective, capstone) | x |
| Course Structure: how the course will be offered (e.g. lecture, seminar, tutorial, fieldtrip)? | x |
| Anticipated pedagogical strategies and instructional design (e.g. Group Work, Case Study, Team Project, Lecture) | x |
| How does this course support Programmatic Learning Outcomes? | x |
| Is this course designed to be partially or fully online? If so, describe how this benefits students and/or program. | n/a |
| **Additional Forms for Specific Course Categories** |  |
| Interdisciplinary Form (if applicable) | n/a |
| Interdisciplinary Committee Recommendation (if applicable and if received)\*  \*Recommendation must be received before consideration by full Curriculum Committee | n/a |
| Common Core (Liberal Arts) Intent to Submit (if applicable) | n/a |
| Writing Intensive Form if course is intended to be a WIC (under development) | n/a |
| If course originated as an experimental course, then results of evaluation plan as developed with director of assessment. | n/a |
| **(Additional materials for Curricular Experiments)** |  |
| Plan and process for evaluation developed in consultation with the director of assessment. (Contact Director of Assessment for more information). |  |
| Established Timeline for Curricular Experiment | x |

# Chancellor’s Report Information

## New Course

**New courses to be offered in the mathematics department**

|  |  |
| --- | --- |
| **Department(s)** | Mathematics |
| **Academic Level** | **[X ] Regular [ ] Compensatory [ ] Developmental [ ] Remedial** |
| **Subject Area** | Mathematics |
| **Course Prefix** | MAT |
| **Course Number** | 1190CO |
| **Course Title** | Quantitative Reasoning Corequisite |
| **Catalog Description** | Guided hands‐on problem‐solving and practice for students in MAT 1190 to develop and apply mathematical, logical, critical thinking, and statistical skills to solve problems in real-world contexts. Students acquire skills in the fields of algebra, geometry, probability, statistics, and mathematical modeling. The course incorporates opportunities within the classroom to develop students’ reading, writing, oral, and listening skills in a mathematical context. |
| **Prerequisite** | Meet the CUNY Math Placement for Elementary Algebra. CUNY proficiency in reading. This course must be taken with the corequisite MAT 1190CO and is offered to students in qualified Non‐STEM majors only. |
| **Corequisite** | MAT 1190 |
| **Pre‐ or corequisite** | None |
| **Credits** | 0 credit |
| **Contact Hours** | 2 hours |
| **Liberal Arts** | **[ X ] Yes [ ] No** |
| **Course Attribute (e.g. Writing Intensive, etc)** |  |
| **Course Applicability** | **[ ] Major**  **[ ] Gen Ed Required [ ] Gen Ed ‐ Flexible [ ] Gen Ed ‐ College**  **Option**  **[ ] English [ ] World Cultures [ ] Speech Composition**  **[ X ] Mathematics [ ] US Experience in its [ ] Interdisciplinary**  **Diversity**  **[ ] Science [ ] Creative Expression [ ] Advanced Liberal**  **Arts**  **[ ] Individual and Society [ ] Scientific World** |
| **Effective Term** | Summer 2018 |

**Rationale:** To support student success in an alternative to elementary algebra track for non‐STEM majors.

## LIBRARY RESOURCES & INFORMATION LITERACY: MAJOR CURRICULUM MODIFICATION

Please complete for **all** major curriculum modifications. This information will assist the library in planning for new courses/programs.

Consult with your library faculty subject specialist (<http://cityte.ch/dir)> **3 weeks before the proposal deadline**.

**Course proposer:** please complete boxes 1‐4. **Library faculty subject specialist:** please complete box 5.

## 1

|  |  |
| --- | --- |
| **Title of proposal**  **New Course: MAT 1190CO Quantitative Reasoning Corequisite** | **Department/Program Mathematics** |
| **Proposed by** (include email & phone)  Sandie Han [shan@citytech.cuny.edu](mailto:shan@citytech.cuny.edu) 718‐260‐5380 | **Expected date course(s) will be offered**  Fall 2018 and onward  **# of students: 50 students per semester** |

## 2

**The library cannot purchase reserve textbooks for every course at the college, nor copies for all students. Consult our website (**[**http://cityte.ch/curriculum)**](http://cityte.ch/curriculum)) **for articles and ebooks for your courses, or our open educational resources (OER) guide (**[**http://cityte.ch/oer).**](http://cityte.ch/oer)) **Have you considered using a freely‐available OER or an open textbook in this course?**

The current textbook is designed to be a workbook for both the classwork and the homework, appropriate for developmental math students. It is not an open source textbook. We will consider other resources and OER.

## 3

**Beyond the required course materials, are City Tech library resources sufficient for course assignments? If additional resources are needed, please provide format details (e.g. ebook, journal, DVD, etc.), full citation (author, title, publisher, edition, date), price, and product link.**

The current library resources are sufficient for the new course. Any required textbook will be ordered through the book store. Multiple copies of the textbook will be obtained by the math department and placed in the library as resources on loan to the students.

**4**

**Library faculty focus on strengthening students' information literacy skills in finding,**

**critically evaluating, and ethically using information. We collaborate on developing assignments and customized instruction and research guides. When this course is offered, how do you plan to consult with the library faculty subject specialist for your area? Please elaborate.**

The current textbook is highly recommended as a quantitative reasoning textbook. We plan to experiment the textbook.

## 5



**Library Faculty Subject Specialist: (Cailean Cooney, Assistant Professor)**

**Comments and Recommendations:** Zero‐cost open textbooks and course materials would be extremely valuable to students moving from developmental to credit‐bearing mathematics courses. In addition to ensuring that students have access to the course material, OERs particularly benefit students in course sequences and remediation by providing reliable access for students to revisit concepts and test their knowledge independently and at the advisement of instructors. Prof. Cooney will keep the Math Department informed of potential funding opportunities to develop OERs and will provide a list of existing OERs to review for adoption and / or modification.

The Library provides resources relevant to the course topic, available both on‐site and online, including print and electronic books, and journal subscriptions. Print books from other CUNY campuses are also available to request. The Library will consider additional resource requests based on budgetary means.

**Date:** 2/28/18

**New York City College of Technology Mathematics Department**

***COURSE CODE: MAT 1190CO***

***TITLE: Quantitative Reasoning Corequisite***

*PREPARED BY*: *Professors Ariane Masuda and Estela Rojas based on the existing MAT 1190 course outline prepared by Professors Nadia Benakli, Holly Carley, Ezra Halleck, Grazyna Niezgoda, Katherine Poirier, Jonas Reitz, and Lin Zhou*

***Number of class hours, lab hours if applicable: 0 credit, 2 class hours***

**COURSE DESCRIPTION:**

Guided hands‐on problem‐solving and practice for students in MAT 1190 to develop and apply mathematical, logical, critical thinking, and statistical skills to solve problems in real-world contexts. Students acquire skills in the fields of algebra, geometry, probability, statistics, and mathematical modeling. The course incorporates opportunities within the classroom to develop students’ reading, writing, oral, and listening skills in a mathematical context.

**COURSE PREREQUISITES:**

Proficiency in reading and mathematics

***OR*** Meet the CUNY Math Placement for Elementary Algebra (A score of 40‐56 on ACCUPLACER Elementary Algebra test). CUNY proficiency in reading. This course must be taken with the corequisite MAT 1190CO and is offered to students in qualified Non‐STEM majors only.

## COREQUISITE: MAT 1190

**REQUIRED TEXTBOOK and/or MATERIALS:**

* + 1. **Textbook: Math in Our World by Dave Sobecki and Allan G. Bluman, 3rd edition, McGraw‐Hill Education**
    2. **Handout activities to be distributed in class (Co‐op Work)**
    3. **A scientific calculator**

Students are expected to attend all sessions and actively participate in all classwork activities. The grades for the course will be either S (satisfactory) or R (repeat).

## COURSE INTENDED LEARNING OUTCOMES/ASSESSMENT METHODS

|  |  |
| --- | --- |
| ***LEARNING OUTCOMES*** | **ASSESSMENT METHODS** |
| **1.** Apply mathematical, logical, critical thinking, and statistical skills to solve problems in real‐world contexts. | **1.** Group activities, written report. |
| **2.** Represent mathematical information symbolically, visually, numerically, and verbally. | **2.** Individual oral presentations, in‐class group activities. |
| **3.** Estimate mathematical quantities as well as evaluate the accuracy of estimates, and adjust estimates when necessary. | **3.** Classroom discussion, in‐class estimation group assignments. |
| **4.** Represent and know how to read, collect and organize data in an assortment of appropriate written and graphical forms. | **4.** Classroom discussion, in‐class group assignments (e.g., students read a newspaper article on a current issue, collect and analyze data related to the issue in the article, and write a report), learning logs. |
| **5.** Recognize and understand functions as a way of modeling correspondence between two variables (linear and exponential). | **5.** Individual short essay related to functions (e.g., population growth, economics, climate change). |
| **6.** Describe the behavior of common functions in words, graphically, algebraically and in tables. | **6.** Written report and group presentation (e.g., an analysis of the garbage patch in the Pacific Ocean), learning logs. |

**GENERAL EDUCATION LEARNING OUTCOMES/ASSESSMENT METHODS**

|  |  |
| --- | --- |
| ***LEARNING OUTCOMES*** | **ASSESSMENT METHODS** |
| **1.** Demonstrate the ability to work collaboratively and independently on assignments in and outside a classroom setting. | **1.** Classroom discussions, group assignments and individual oral presentations. |
| **2.** Understand and employ both quantitative and qualitative analysis to solve problems**.** | **2.** Classroom discussion, group activities, group presentations, quizzes, tests, final exam. |
| **3.** Develop reading, writing competencies, and listening skills. | **3.** Biweekly reading and writing assignments, individual and group presentation, classroom discussion. Each homework assignment requires written |

|  |  |
| --- | --- |
|  | responses. |
| **4.** Work with teams. Build consensus. Use creativity. | **4.** Group projects and presentations. |

**ACADEMIC INTEGRITY POLICY STATEMENT**

Students and all others who work with information, ideas, texts, images, music, inventions, and other intellectual property owe their audience and sources accuracy and honesty in using, crediting, and citing sources. As a community of intellectual and professional workers, the College recognizes its responsibility for providing instruction in information literacy and academic integrity, offering models of good practice, and responding vigilantly and appropriately to infractions of academic integrity. Accordingly, academic dishonesty is prohibited in The City University of New York and at New York City College of Technology and is punishable by penalties, including failing grades, suspension, and expulsion. The complete text of the College policy on Academic Integrity may be found in the catalog.

Grading rubrics:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Letter Grade** | A | A- | B+ | B | B- | C+ | C | D | F |
| **Numerical Grade** | 93-100 | 90-92.9 | 87-89.9 | 83-86.9 | 80-82.9 | 77-79.9 | 70-76.9 | 60-69.9 | <=59.9 |

## \*Handout activities to be distributed in class: Co‐op Work

**\*\*Textbook: Math in Our World by Dave Sobecki and Allan G. Bluman, 3rd edition, McGraw‐Hill Education**

**Scope of work for the corequisite\*:**

* Learning log
* Participation in group work and discussion
* Homework reading assignments
* Group projects and presentation
* Quizzes
* Depending on department policy, these may be uniform and required for all instructors of the course or there may be guidelines or samples from which instructors may select or adapt.

|  |  |  |
| --- | --- | --- |
| **Session** | **Co‐op Work\*** | **Topic** |
| 1 | 1 | mathematical reasoning |
| 2 | 2 | estimation and graphs |
| 3 | 3 | statements/quantifiers |
| 4 | 4 | truth tables |
| 5 | 5 | linear equations |
|  | 5 | applications of linear equations |
| 6 |  | exam I |
| 7 | 6 | ratio, proportion and direct variation |
| 8 | 7 | linear inequalities |
| 9 | 8 | systems of linear equations |
| 10 | 9 | percents |
| 11 | 10 | simple interest |
| 12 | 11 | compound interest |
| 13 |  | exam II |
| 14 | 12 | length and unit conversions |
| 15 | 13 | area, volume and capacity |
| 16 | 14 | weight and temperature |
| 17 | 15 | points, lines, planes and angles |
| 18 | 16 | triangles |
| 19 | 17 | polygons and perimeter |
|  | 17 | areas of polygons and circles |
| 20 |  | exam III |
| 21 | 18 | basic probability |

|  |  |  |
| --- | --- | --- |
| 22 | 19 | tree diagrams, tables |
| 23 | 20 | gather/organize data |
|  | 20 | picture data |
| 24 | 21 | measures of average |
|  | 21 | measures of variation |
| 25 |  | exam IV |
| 26 | 22 | measures of position |
| 27 | 23 | normal distribution |
| 28 | 24 | correlation and regression |
| 29 |  | review |
| 30 |  | final exam |

## Needs Assessment:

Note 2/20/18: This proposal was originally submitted on 3/2/2017 to pilot MAT 1275EN, and MAT 1190EN. Following successful piloting in summer and fall 2017, described below, the department proposes to continue the development process but to adjust the configuration originally proposed. Rather than proposing variants of MAT 1275, MAT 1190, and MAT 065, the department will retain the current courses and 1) propose the approval of non‐credit corequisite courses for students who qualify and 2) amend the prerequisites of the current courses affected to include the corequisites for students who qualify. The rationale, content, and total number of hours remain as originally proposed. Instead of offering MAT 1275 (4 hrs, 4 credits) and MAT 1275EN (6 hrs., 4 credits), the department proposes to enroll all of the students in MAT 1275 but require students with lower scores to register for sections linked to the non‐credit corequisite, MAT1275CO (2 hrs, 0 credits). The change was made principally to avoid financial aid problems for students who need to repeat the credit course because the F/D repeat policy applies only to the same course number, which the EN suffix rendered impossible.

The proposed MAT 1190 sections with corequisite will allow students, after meeting the arithmetic standard, to take the credit level course MAT 1190 Quantitative Reasoning without taking elementary algebra and the CEAFE exam. This proposal responds to EVC Rabinowitz’s memo to develop an alternative to the elementary algebra mathematics track. Because these students are, in essence, skipping a prerequisite course ‐ it is necessary to supplement their MAT1190 experience. This supplement takes the form of two additional zero‐credit classroom hours.

## Course Design:

MAT 1190 focuses mainly on real world problem‐solving in topics, such as tax, finance, probability and statistics, and simple mathematical models. Because the students in the corequisite sections will have met only the minimum arithmetic standard, it is important

that we provide additional support to strengthen their problem‐solving strategies and skills. The additional two hours of class time will be used for group work, modules, or hands‐on work. It is expected that these students will need to move through the material at a slower pace, requiring more practice, and thus necessitating the addition of class time.

## Course Structure:

The MAT1190+corequisite is structured to meet twice a week, for 2 ½ hours. This will allow time for hands‐on work, group work, and additional problem‐solving.

## Pedagogical Strategies and Instructional Design:

Instructors participating in the corequisite sections will implement different cooperative learning strategies such as Think‐Pair‐Share, Round Table, Jigsaw, and many others. These strategies will allow students to develop and enhance the general education outcomes mentioned above. Students will work at each meeting on different hands on activities that will be structured to make them share ideas, present their work either individually or as a team, and at the end of each activity hour they will submit their written work. The use of these pedagogical strategies will allow faculty to develop students’ self‐confidence on their learning abilities reducing, as a result, their math anxiety, and at the same time to motivate students work on their own mindset.

## Plan and Process for Evaluation:

Experimental sections of corequisite MAT1190 will take the same final exam as all MAT 1190 sections. By using a scoring guide to aid in a standardized evaluation process, we will collect item‐level data on the final exam for comparison to current MAT 1190 final exam outcomes. Overall passing rates will also be compared.

We plan to pilot 6 sections each semester. If the enrollment is approximately 30 students per section, we anticipate approximately 180 students will participate in the pilot sections over the academic year 2018‐2019, including summer 2018. We are planning to recruit from non‐STEM majors who have met the ACCUPLACER arithmetic standard (a score of 40‐ 56 on the elementary algebra test).

Besides the learning outcome assessment, we will examine passing rates in the pilot sections of corequisite MAT 1190 and compare them with the regular MAT 1190 sections. For students who continue on to take MAT 1272 statistics, we will track their performance in MAT 1272.

A pilot section of MAT 1190EN was offered in the Fall 2017 semester, with these results:

## Fall 2017 Pilot Data

**MAT 1190EN and 1190 grade distribution – detail**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **MAT 1190EN** | | **MAT 1190** | |
|  | **N** | **%** | **N** | **%** |
| A | 6 | 24.0% | 101 | 9.3% |
| A‐ | 1 | 4.0% | 53 | 4.9% |
| B+ | 2 | 8.0% | 59 | 5.4% |
| B | 3 | 12.0% | 97 | 8.9% |
| B‐ | 2 | 8.0% | 67 | 6.2% |
| C+ | 0 | 0.0% | 72 | 6.6% |
| C | 2 | 8.0% | 181 | 16.7% |
| D | 2 | 8.0% | 148 | 13.6% |
| F | 4 | 16.0% | 137 | 12.6% |
| Inc | 0 | 0.0% | 9 | 0.8% |
| W | 0 | 0.0% | 76 | 7.0% |
| WU | 3 | 12.0% | 83 | 7.6% |
| WF | 0 | 0.0% | 2 | 0.2% |
| WN | 0 | 0.0% | 7 | 0.6% |
| WA | 0 | 0.0% | 0 | 0.0% |
| WD | 0 | 0.0% | 15 | 1.4% |
|  |  |  |  |  |
| Total | 25 |  | 1107 |  |
| Total minus WN, WA, WD | 25 |  | 1085 |  |

**Fall 2017 MAT 1190EN and 1190 grade distribution ‐ summary**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **MAT 1190EN** | | **MAT 1190** | |
|  | **N** | **%** | **N** | **%** |
| A | 7 | 28.0% | 154 | 14.2% |
| B | 7 | 28.0% | 223 | 20.6% |
| C | 2 | 8.0% | 253 | 23.3% |
| D | 2 | 8.0% | 148 | 13.6% |
| F/WU/W/WF | 7 | 28.0% | 298 | 27.5% |
| Incomplete | 0 | 0.0% | 9 | 0.8% |
|  |  |  |  |  |
| A,B,C grades | 16 | 64.0% | 630 | 58.1% |
| A,B,C,D grades | 18 | 72.0% | 778 | 71.7% |

**Fall 2017 MAT 1190EN and 1190 grade distribution – summary chart**



30.0%

25.0%

20.0%

15.0%

10.0%

5.0%

0.0%

MAT 1190EN

MAT 1190

Summary Finding: MAT 1190EN pilot section student performance is comparable to the MAT 1190 regular section student performance (72% pass rate versus 71.7% pass rate).

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 for information about what types of modifications are major or minor. Completed proposals should be emailed to the Curriculum Committee chair.** New York City College of Technology, CUNY

NEW COURSE PROPOSAL FORM

This form is used for all new course proposals. Attach this to the Curriculum Modification Proposal Form and submit as one package as per instructions. Use one New Course Proposal Form for each new course.

|  |  |
| --- | --- |
| **Course Title** | Elementary Algebra Corequisite |
| **Proposal Date** | 2/20/2018 |
| **Proposer’s Name** | Sandie Han |
| **Course Number** | MAT 065CO |
| **Course Credits, Hours** | 0 credit, 2 hours |
| **Course Pre / Corequisites** | Meet the CUNY Math Placement for Arithmetic (ACCUPLACER Elementary Algebra score of 39 or less), and must be taken with the corequisite MAT 065CO.  **Corequisite**: MAT 065 |
| **Catalog Course Description** | Guided hands‐on problem‐solving and practice for students in MAT 065 to develop the fundamentals of elementary algebra with an integrated review and reinforcement of arithmetic skills. Topics include the real number system, numerical evaluation, algebraic operations, algebraic and graphical solutions of one and two variable linear equations, word problems, algebraic fractions, and quadratic equations. For students with a limited knowledge of elementary algebra. |
| **Brief Rationale**  Provide a concise summary of why this course is important to the department, school or college. | To provide additional support for developmental math students to work on problem‐solving in an active learning and computer‐aided environment. |
| **CUNY – Course Equivalencies** Provide information about equivalent courses within CUNY, if any. |  |
| **Intent to Submit as Common Core**  If this course is intended to fulfill one of the requirements in the common core, then | No |

|  |  |
| --- | --- |
| indicate which area. |  |
| **For Interdisciplinary Courses:**   * Date submitted to ID Committee for review * Date ID recommendation received   - Will all sections be offered as ID? Y/N | No |
|  |
|  |
| **Intent to Submit as a Writing Intensive Course** | No |

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## NEW COURSE PROPOSAL CHECK LIST

Use this checklist to ensure that all required documentation has been included. You may wish to use this checklist as a table of contents within the new course proposal.

|  |  |
| --- | --- |
| **Completed NEW COURSE PROPOSAL FORM** |  |
| * Title, Number, Credits, Hours, Catalog course description | x |
| * Brief Rationale | x |
| * CUNY – Course Equivalencies |  |
| Completed Library Resources and Information Literacy Form |  |
| **Course Outline**  Include within the outline the following. |  |
| Hours and Credits for Lecture and Labs  If hours exceed mandated Carnegie Hours, then rationale for this | x |
| Prerequisites/Co‐ requisites | x |
| Detailed Course Description | x |
| Course Specific Learning Outcome and Assessment Tables   * Discipline Specific * General Education Specific Learning Outcome and Assessment Tables | x |
| Example Weekly Course outline | x |
| Grade Policy and Procedure | x |
| Recommended Instructional Materials (Textbooks, lab supplies, etc) |  |
| Library resources and bibliography |  |
| **Course Need Assessment.**  Describe the need for this course. Include in your statement the following information. |  |
| Target Students who will take this course. Which programs or departments, and how many anticipated?  Documentation of student views (if applicable, e.g. non‐required elective). | x |
| Projected headcounts (fall/spring and day/evening) for each new or modified course. |  |
| If additional physical resources are required (new space, modifications, equipment), description of these requirements. If applicable, Memo or email from the VP for Finance and Administration with written comments regarding additional and/or new facilities, renovations or construction. | n/a |
| Where does this course overlap with other courses, both within and outside of the department? |  |
| Does the Department currently have full time faculty qualified to teach | x |

|  |  |
| --- | --- |
| this course? If not, then what plans are there to cover this? |  |
| If needs assessment states that this course is required by an accrediting body, then provide documentation indicating that need. | n/a |
| **Course Design**  Describe how this course is designed. |  |
| Course Context (e.g. required, elective, capstone) | X |
| Course Structure: how the course will be offered (e.g. lecture, seminar, tutorial, fieldtrip)? | X |
| Anticipated pedagogical strategies and instructional design (e.g. Group Work, Case Study, Team Project, Lecture) | X |
| How does this course support Programmatic Learning Outcomes? | X |
| Is this course designed to be partially or fully online? If so, describe how this benefits students and/or program. | n/a |
| **Additional Forms for Specific Course Categories** |  |
| Interdisciplinary Form (if applicable) | n/a |
| Interdisciplinary Committee Recommendation (if applicable and if received)\*  \*Recommendation must be received before consideration by full Curriculum Committee | n/a |
| Common Core (Liberal Arts) Intent to Submit (if applicable) | n/a |
| Writing Intensive Form if course is intended to be a WIC (under development) | n/a |
| If course originated as an experimental course, then results of evaluation plan as developed with director of assessment. | n/a |
| **(Additional materials for Curricular Experiments)** |  |
| Plan and process for evaluation developed in consultation with the director of assessment. (Contact Director of Assessment for more information). |  |
| Established Timeline for Curricular Experiment |  |

# Chancellor’s Report Information

## New Course

**New courses to be offered in the mathematics department**

|  |  |
| --- | --- |
| **Department(s)** | Mathematics |
| **Academic Level** | **[ ] Regular [ ] Compensatory [ X ] Developmental [ X ] Remedial** |
| **Subject Area** | Developmental mathematics |
| **Course Prefix** | MAT |
| **Course Number** | 065CO |
| **Course Title** | Elementary Algebra |
| **Catalog Description** | Guided hands‐on problem‐solving and practice for students in MAT 065 to develop the fundamentals of elementary algebra with an integrated review and reinforcement of arithmetic skills. Topics include the real number system, numerical evaluation, algebraic operations, algebraic and graphical solutions of one and two variable linear equations, word problems, algebraic fractions, and quadratic equations. For students with a limited knowledge of elementary algebra. |
| **Prerequisite** | Meet the CUNY Math Placement for Arithmetic, and must be taken with the corequisite MAT 065CO. |
| **Corequisite** | MAT 065 |
| **Pre‐ or corequisite** | None |
| **Credits** | 0 credit |
| **Contact Hours** | 2 hours |
| **Liberal Arts** | **[ ] Yes [ X ] No** |
| **Course Attribute (e.g. Writing Intensive, etc)** |  |
| **Course Applicability** | **[ ] Major**  **[ ] Gen Ed Required [ ] Gen Ed ‐ Flexible [ ] Gen Ed ‐ College**  **Option**  **[ ] English [ ] World Cultures [ ] Speech Composition**  **[ X ] Mathematics [ ] US Experience in its [ ] Interdisciplinary**  **Diversity**  **[ ] Science [ ] Creative Expression [ ] Advanced Liberal**  **Arts**  **[ ] Individual and Society [ ] Scientific World** |
| **Effective Term** | Summer 2018 |

**Rationale:** To provide additional support for developmental math students to work on problem‐ solving in an active learning and computer‐aided environment.

## LIBRARY RESOURCES & INFORMATION LITERACY: MAJOR CURRICULUM MODIFICATION

Please complete for **all** major curriculum modifications. This information will assist the library in planning for new courses/programs.

Consult with your library faculty subject specialist (<http://cityte.ch/dir)> **3 weeks before the proposal deadline**.

**Course proposer:** please complete boxes 1‐4. **Library faculty subject specialist:** please complete box 5.

## 1

|  |  |
| --- | --- |
| **Title of proposal**  **New Course: MAT 065CO Elementary Algebra Corequisite** | **Department/Program Mathematics** |
| **Proposed by** (include email & phone) | **Expected date course(s) will be offered** |
| Sandie Han | Fall 2018 and onward |
| [shan@citytech.cuny.edu](mailto:shan@citytech.cuny.edu) | **# of students: 400‐500 students per** |
| 718‐260‐5380 | **semester** |

## 2

**The library cannot purchase reserve textbooks for every course at the college, nor copies for all students. Consult our website (**[**http://cityte.ch/curriculum)**](http://cityte.ch/curriculum)) **for articles and ebooks for your courses, or our open educational resources (OER) guide (**[**http://cityte.ch/oer).**](http://cityte.ch/oer)) **Have you considered using a freely‐available OER or an open textbook in this course?**

Yes. Currently, we have an open source textbook and problem‐solving workbook written by City Tech math faculty. We will also consider other resources and OER.

## 3

**Beyond the required course materials, are City Tech library resources sufficient for course assignments? If additional resources are needed, please provide format details (e.g. ebook, journal, DVD, etc.), full citation (author, title, publisher, edition, date), price, and product link.**

The current library resources are sufficient for the new course. Any required textbook will be ordered through the book store. Multiple copies of the textbook will be obtained by the math department and placed in the library as resources on loan to the students.

**4**

**Library faculty focus on strengthening students' information literacy skills in finding, critically evaluating, and ethically using information. We collaborate on developing assignments and customized instruction and research guides. When this course is**

**offered, how do you plan to consult with the library faculty subject specialist for your area? Please elaborate.**

The open source textbook written by math faculty is currently being experimented. We can further the conversation with the library faculty on how to make it widely available as OER.

## 5



**Library Faculty Subject Specialist: (Cailean Cooney, Assistant Professor)**

**Comments and Recommendations:** Zero‐cost open textbooks and course materials would be extremely valuable to students moving from developmental to credit‐bearing mathematics courses. In addition to ensuring that students have access to the course material, OERs particularly benefit students in course sequences and remediation by providing reliable access for students to revisit concepts and test their knowledge independently and at the advisement of instructors. Prof. Cooney will keep the Math Department informed of potential funding opportunities to develop OERs and will provide a list of existing OERs to review for adoption and / or modification.

The Library provides resources relevant to the course topic, available both on‐site and online, including print and electronic books, and journal subscriptions. Print books from other CUNY campuses are also available to request. The Library will consider additional resource requests based on budgetary means.

**Date:** 2/28/18

## NEW YORK CITY COLLEGE OF TECHNOLOGY

**The City University of New York**

**DEPARTMENT:** Mathematics

**COURSE:** MAT 065CO

**TITLE:** Elementary Algebra Corequisite

**DESCRIPTION:** Guided hands‐on problem‐solving and practice for students in MAT 065 to develop the fundamentals of elementary algebra with an integrated review and reinforcement of arithmetic skills. Topics include the real number system, numerical evaluation, algebraic operations, algebraic and graphical solutions of one and two variable linear equations, word problems, algebraic fractions, and quadratic equations. For students with a limited knowledge of elementary algebra.

**TEXT:** Beginning Algebra, 8th Edition, Baratto and Bergman

## CREDITS/HOURS 0 credit, 2 hours

**PREREQUISITE** Meet the CUNY Math Placement for Arithmetic (ACCUPLACER Elementary Algebra score of 39 or less), and must be taken with the corequisite MAT 065CO.

**COREQUISITE:** MAT 065

Students are expected to attend all sessions and actively participate in all classwork activities. The grades for the course are either S (satisfactory) or R (repeat).

## Course Intended Learning Outcomes/Assessment Methods

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Learning Outcomes** | | **Assessment Methods** | | |
| **1.** Use the rules for addition, subtraction, multiplication and division to perform basic operations with integers. | | Classroom activities including written and oral presentations, concept vocabulary, homework, exams. | | |
| **2.** Fractions: Convert improper fractions to and from mixed numbers. Add, subtract, multiply and divide fractions. | | Classroom activities, in‐class group activities to compare numbers, homework, exams. | | |
| **3.** Decimal numbers: Add, subtract, multiply and divide fractions. Convert decimals to and from fractions. | | Classroom activities homework, exams. | and | discussion, |
| **4.** Convert decimal and whole numbers to and from scientific notation. | | In‐class group activity to estimate very large and very small numbers, concept vocabulary, homework, exams. | | |
| **5.** Use the Order of Operations Rule to evaluate numerical expressions and verbally stated problems containing more than one operation. Evaluate algebraic expressions and formulas. Solve one variable linear equations. | | Concept vocabulary, classroom discussion, and homework. | | |
| **6.** Solve | One variable linear equations. Ratio and proportion problems. Percentage problems.  Rate, time, and distance problems. Measures of central tendency problems. | In‐class group assignments, written and oral presentation, homework. | | |

**General Education Learning Outcomes/Assessment Methods**

|  |  |
| --- | --- |
| **Learning Outcomes** | **Assessment Methods** |
| **1.** Understand and employ both quantitative and qualitative analysis to solve problems. | Classroom activities and discussion, homework, exams. |
| **2.** Employ scientific reasoning and logical thinking. | Classroom activities and discussion, homework, exams. |
| **3.** Communicate effectively using written and oral means. | Classroom activities and discussion, homework, exams. |
| **4.** Solve real world applications. | Classroom activities and discussion, homework, exams. |

MAT065CO Course Outline

Text: Beginning Algebra, 8th Edition, Baratto and Bergman

|  |  |  |
| --- | --- | --- |
| **Week** | **Topics** | **WeBWorK Assignment or handouts** |
| 1 | Signed number reviews |  |
| 2 | Exponents and Algebraic Evaluation | Chapter 4 Evaluating Expressions Chapter 5 Properties of Exponents |
| 3 | Solving Linear Equations | Chapter 16 Solving Linear Equations |
| 4 | Polynomials | Chapter 8 – Adding and Subtracting Polynomials Chapter 9‐Multiplying Polynomial Expressions Chapter 10 Dividing Polynomials |
| 5 | Factoring | chapter12‐ FactoringMonomialFromPolynomialGCF Chapter 13 Factoring the Difference of Two Squares  Chapter 14 Factoring Trinomials and Mixed Factoring |
| 6 | Solving Quadratic Equations | Chapter 20 Solving Quadratic Equations by Factoring |
| 7 | Rational Expressions (Multiplication and Division) | Chapter 22 Simplifying, Multiplying and Dividing Rational Expressions |
| 8 | Rational Expressions (Addition and Subtraction) | Chapter 23 Adding and Subtracting Rational Expressions |
| 9 | Rational Equations and Decimal Equations | Chapter 17 Solving Linear Equations, Decimals, Rationals |
| 10 | Graph Linear Equations in Two Variables | Chapter 26 Graphing Linear Equations |
| 11 | Solve System of Equations on Two Variables | chapter27‐ Solving System Linear Equations Algebraically  Chapter 28 Solving a System of Linear Equations Graphically |
| 12 | Scientific Notations | Chapter 6‐ScientificNotation |
| 13 | Simplifying Radicals | Chapter 11‐SimplifyingSquareRoots |
| 14 | Application problems, Word problems | Chapter 18 Word Problems for Linear Equations |
| 15 | Final Exam Review |  |

## Needs Assessment:

Typically, there are between 400‐500 students enrolled in our MAT 063 course. Currently, students are placed in mathematics according to scores on the Elementary Algebra Test of the ACCUPLACER:

20‐39 MAT 063

40‐56 MAT 065

57+ CUNY Math proficient

.

The MAT 063 curriculum covers the same topics and the same level of learning outcomes as MAT 065, but with extended time. The passing rate of MAT 063 has been dismal, in the range of 20%. Most students fail their first time taking the course, and even the second time.

## Course Design and Structure

The City Tech Math Department is proposing a different model from the current MAT 063. The model calls for all developmental math students to take MAT 065, with those having scores in the lower range required to enroll in a linked corequisite course. The corequisite, will meet on a separate day and focus on active problem‐solving at an individualized pace in a computer‐aided environment. In addition to the syllabus of MAT 065, this corequisite course will to focus on problem‐solving, arithmetic reviews, and concept reinforcement.

Instructors for the corequisite section will receive training in WeBWorK, as well as active learning pedagogy.

## Pedagogical Strategies and Instructional Design:

The course will focus on problem‐solving. Instructors teaching the corequisite sections will be encouraged to attempt different active learning strategies which may include mini lectures, group work, problem‐solving using faculty developed modules, or use of open education resources such as WeBWorK or instructional videos.

## Plan and Process for Evaluation:

Because the class will take place in a computer lab, we will restrict the class size to 24. We plan to offer 20 sections of the corequisite with links to MAT 065 sections.

Besides the learning outcome assessment, we will examine passing rates in the MAT 065+corequisite as well as tracking the passing rates of these students in the subsequent courses (either MAT 1190 for non‐STEM students or MAT 1275+corequisite for STEM students).

## 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 for information about what types of modifications are major or minor. Completed proposals should be emailed to the Curriculum Committee chair.**

|  |  |
| --- | --- |
| **Title of Proposal** | **Prerequisite change for MAT 1275, MAT 1190, MAT 065** |
| **Date** | **2/23/2018** |
| **Major or Minor** | **Minor** |
| **Proposer’s Name** | **Sandie Han** |
| **Department** | **Mathematics** |
| **Date of Departmental Meeting in which proposal was approved** | **Pending: 3/1/2018** |
| **Department Chair Name** | **Sandie Han** |
| **Department Chair Signature and Date** | **2/23/2018** |
| **Academic Dean Name** | **Justin Vazquez‐Poritz** |
| **Academic Dean Signature and Date** | **2/23/18** |
| **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.** | 1. The prerequisite of MAT 1275 is changed   **From**: MAT1175  ***OR*** new students with ACCUPLACER scores of 57+ on Elementary Algebra and 60 ‐ 79 on College‐Level Math  **To**: MAT1175  ***OR*** Meet Math Department Placement Criteria  ***OR*** CUNY Proficiency in Math. This course must be taken with the corequisite MAT 1275CO. Students who took MAT 1190CO need department approval and must demonstrate proficiency in Elementary Algebra.   1. The prerequisite of MAT 1190 is changed   **From**: Proficiency in reading and mathematics **To**: |

|  |  |
| --- | --- |
|  | Proficiency in reading and mathematics  ***OR*** Meet the CUNY Math Placement for Elementary Algebra. CUNY proficiency in reading. This course must be taken with the corequisite MAT 1190CO and is offered to students in qualified Non‐STEM majors only.  3) The prerequisite of MAT 065 is changed  **From**: A score of 40‐56 on ACCUPLACER Elementary Algebra  **To**: Meet the CUNY Math Placement for the Elementary Algebra  ***OR*** meet the CUNY Math Placement for Arithmetic, and must be taken with the corequisite MAT 065CO. |
| **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).** | Per a Board of Trustees resolution, CUNY Math Departments are required to offer some students who place in the upper level of developmental Math, the opportunity to take a credit‐bearing math course with non‐credit corequisite support. Campus Math Departments have discretion re the placement criteria, structure of their sequences, and the format of the non‐ credit support offered. The City Tech Math Department, in consultation with the Math Discipline Council and CUNY Academic Affairs/ OIRA, has determined placement criteria and has been working on the instructional design for the non‐credit corequisites.  **See Appendix:** Plan for Implementation of Revised Mathematics Sequences Submitted to CUNY OAA, February 6, 2017; updated, March 17, 2016.  The adjustments in the prerequisite allow students who don’t meet the prerequisite to take the course with the corequisite support. |
| **Proposal History**  **(Please provide history of this proposal: is this a resubmission? An updated version? This may most easily be expressed as a list).** |  |

**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 | 3/1/2018 |
| * Chair’s Signature | 2/22/2018 |
| * Dean’s Signature |  |
| Evidence of consultation with affected departments  List of the programs that use this course as required or elective, and courses that use this as a prerequisite. |  |
| Documentation of Advisory Commission views (if applicable). |  |
| Completed Chancellor’s Report Form. |  |

**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) |  |

**AV.1. Mathematics Department**

**Existing Course Number and Course Title: MAT 1275 College Algebra and Trigonometry**

|  |  |  |  |
| --- | --- | --- | --- |
| **From:** |  | **To:** |  |
| **Course Number:** |  | **Course Number:** |  |
| **Course Title:** |  | **Course Title:** |  |
| **Description:** |  | **Description:** |  |
| **Class Hours :** |  | **Class Hours:** |  |
| **Lab Hours :** |  | **Lab Hours:** |  |
| **Credits:** |  | **Credits:** |  |
| **Prerequisite**  **:** | MAT1175  *OR* new students with ACCUPLACER scores of 57+  on Elementary Algebra and 60 ‐ 79 on College‐ Level Math | **Prerequisite:** | MAT 1175  ***OR*** Meet Math Department Placement Criteria  ***OR*** CUNY Proficiency in Math. This course must be taken with the corequisite MAT 1275CO. Students who took MAT 1190CO need department approval and must demonstrate proficiency in Elementary Algebra. |
| **Corequisites**  **:** |  | **Corequisites:** |  |
| **Pre‐ or corequisites**  **:** |  | **Pre‐ or corequisites:** |  |

**Rationale:** To provide an accelerated track with extra support for students to enroll in college algebra and trigonometry after passing developmental math and/or meeting CUNY proficiency in mathematics. The prerequisite for MAT 1275 is modified and used to determine the different levels of support for the students.

**AV.1. Mathematics Department**

## Existing Course Number and Course Title: MAT 1190 Quantitative Reasoning

|  |  |  |  |
| --- | --- | --- | --- |
| **From:** |  | **To:** |  |
| **Course Number:** |  | **Course Number:** |  |
| **Course Title:** |  | **Course Title:** |  |
| **Description:** |  | **Description:** |  |
| **Class Hours :** |  | **Class Hours:** |  |
| **Lab Hours :** |  | **Lab Hours:** |  |
| **Credits:** |  | **Credits:** |  |
| **Prerequisite**  **:** | Proficiency in reading and mathematics | **Prerequisite:** | Proficiency in reading and mathematics  ***OR*** Meet the CUNY Math Placement for Elementary Algebra. CUNY proficiency in reading. This course must be taken with the corequisite MAT 1190CO and is offered to students in qualified Non‐STEM majors only. |
| **Corequisites**  **:** |  | **Corequisites:** |  |
| **Pre‐ or corequisites**  **:** |  | **Pre‐ or corequisites:** |  |

**Rationale:** To provide an accelerated track for students in non‐STEM majors to enroll in the credit level Quantitative Reasoning without the Elementary Algebra, while receiving extra support from the corequisite course. The prerequisite for MAT 1190 is modified and used to determine the different levels of support for the students.

## AV.1. Mathematics Department

**Existing Course Number and Course Title: MAT 065 Elementary Algebra**

|  |  |  |  |
| --- | --- | --- | --- |
| **From:** |  | **To:** |  |
| **Course Number:** |  | **Course Number:** |  |
| **Course Title:** |  | **Course Title:** |  |
| **Description:** |  | **Description:** |  |
| **Class Hours :** |  | **Class Hours:** |  |
| **Lab Hours :** |  | **Lab Hours:** |  |
| **Credits:** |  | **Credits:** |  |
| **Prerequisite**  **:** | A score of 40‐56 on ACCUPLACER  Elementary Algebra | **Prerequisite:** | Meet the CUNY Math Placement for the Elementary Algebra  ***OR*** meet the CUNY Math Placement for Arithmetic, and must be taken with the corequisite MAT 065CO. |
| **Corequisites**  **:** |  | **Corequisites:** |  |
| **Pre‐ or corequisites**  **:** |  | **Pre‐ or corequisites:** |  |

**Rationale:** To provide additional support for developmental math students to work on problem‐ solving in an active learning and computer‐aided environment. The prerequisite for MAT 065 is modified and used to determine the different levels of support for the students.

# APPENDIX

New York City College of Technology

Plan for Implementation of Revised Mathematics Sequences Submitted to CUNY OAA, February 6, 2017; updated, March 17, 2016

## Coordinators

Bonne August, Provost and Vice President for Academic Affairs Pamela Brown, Associate Provost

Sandie Han, Professor and Chair, Department of Mathematics Justin Vazquez‐Poritz, Dean, School of Arts & Sciences

## BACKGROUND AND RATIONALE

The majority of City Tech’s degree programs are concentrated in technology, science, and health, with the remainder in other career‐focused areas like hospitality management, business, and communication design. All of the college’s baccalaureate programs lead either to BS or BTech degrees; the college does not offer a BA. Except for an AA in Liberal Arts, the associate degree programs are mainly AAS degrees, with some AS degrees. For this reason, a large percentage of students need algebra, and many require calculus. During the transition to Pathways, the Math Department developed a three‐credit Quantitative Reasoning course that meets the math requirement for most non‐STEM majors, and therefore since Fall 2013 the college has had both a STEM and a Pathways‐approved non‐ STEM credit‐bearing track in mathematics. In Fall 2016, 6525 students took math classes ranging from developmental math through Calculus I. Of these, a total of 3667 students (56.2%) were in the STEM track, with 2858 (43.8%) in the non‐STEM track.

## CURRENT SEQUENCES

Currently, regardless of major, all students identified as having a need for developmental math, place into the same non‐credit sequence before proceeding to one of the credit‐ bearing math courses:

## Current Developmental Math

Math 063 (7 hrs., 0 credits) Elementary Algebra with Basic Mathematics Review Math 065 (5 hrs, 0 credits) Elementary Algebra

Developmental Math persistently accounts for the largest number of students in the FYE Summer Immersion Program (CUE).

## Current Non‐STEM Math Sequence

Non‐STEM students take MAT 1190, Quantitative Reasoning (3 hrs., 3 credits). Faculty in the Math Dept., assisted by CUNY QR Fellows, have continued to develop

the curriculum and teaching materials for this course, which has been well‐received. MAT 1190 is a pre‐requisite for MAT 1272, Statistics (3hrs., 3 credits), which several non‐STEM programs require.

## Current STEM Math Sequence

Students in STEM‐focused program, as determined either by initial placement or successful completion of the developmental sequence, begin at a point in the following sequence:

MAT 1175 Fundamentals of Mathematics (4 hrs., 4 credits) MAT 1275 College Algebra and trigonometry (4 hrs, 4 credits) MAT 1375 Pre‐Calculus (4 hrs., 4 credits)

Mat 1475 Calculus (4 hrs., 4 credits) MAT 1575 Calculus II (4 hrs., 4 credits)

## Pass Rates and Retention

The overall success of these high enrollment math courses has been a continuing source of concern. For Fall 2015, for example, of 699 students who completed MAT 063, the lower developmental course, the pass rate was 27.3%. It should be further noted that the completion rate for the course was only 53.9%. The table below indicates the number of students who completed the course, with the number in parentheses indicating the percentage that number represents of those originally enrolled. For the credit courses, the overall pass rate is shown, as well as the percentage who earned A, B, or C and the percentage who received a D.

|  |  |  |
| --- | --- | --- |
| **Course** | **Completers\*** | **Pass rate** |
| 063 | 699 (53.9%) | 27.3% |
| 065 | 1137  (62.6%) | 48.6% |
| 1175 | 834 (81.4%) | 59.2 (C)+17.4  (D)=76.6% |
| 1275 | 1454  (81.8%) | 58.1% (C )+17.2  (D)=75.3% |
| 1375 | 1156  (84.1%) | 63.9 (C )+16.8 (D)=  80.7% |
| 1475 | 906 (84.9) | 56.7 (C );+18.9 (D)=75.6% |

There is tramendous variability among instructors regarding both retention and pass rates. We don’t have data regarding the performance broken down for students whose initial

placement put them into MAT 1175 as compared to those who first completed the developmental sequence or for first‐time course‐takers versus repeaters. However, we do know that a D or even a C grade does not bode well for performance in the subsequent course.

By contrast, the overall completion rate for MAT 1190, the non‐STEM track, was 86.5% in Fall 2015, with a pass rate of 90.6 % (78% C or higher).

## Supports for Math students

To accelerate students’ progress, the college and the Math Department have piloted many strategies, using grant and CUNY funding. These include pre‐testing and pre‐course workshops, classroom‐based support, learning communities, self‐regulated learning (SRL), electronic tools, and traditional tutoring, and many others. Some have proven effective in pilots but are not scalable. Others offer more promise for larger‐scale implementation, including

* + Peer Led Team Learning (PLTL)
  + MSEIP pre‐course workshops and self‐paced materials
  + Title V Opening Gateways for online instructional and support materials for MAT 1275
  + ASAP support for application of math in the majors

It sometimes seems as if no amount of additional resources to support students in math would be enough to meet the demand. In order to achieve better coordination among these efforts and also to inform students more effectively about the various forms of academic support, a Math Support group was formed in Spring 2016 including: SEEK, ASAP, Student Accessibility Center, Learning Center, BMI, and other who provide assistance in math, either to targeted groups or generally. The goal is two‐fold: to assess, implement, and share best practices and to coordinate and disseminate information to students, faculty, and staff so that anyone in need of support has ready access to proven, high‐quality assistance.

In addition to students’ needs with mathematics itself, they are very challenged when they must apply mathematics in technology and engineering technology classes. For many students, despite their having demonstrated competence in math courses, mathematics is not a tool in the way it needs to be in these fields.

## PROPOSED SEQUENCES

To accelerate students’ progress and increase student success, the college proposes reconfiguring both the developmental and the credit mathematics sequences, in compliance with University guidelines as follows:

**Placement**

**Exemption—Per CUNY policy, students will be considered proficient if they score:**

* New York State Regents‐Algebra 1 or Geometry—70; or Algebra

|  |  |  |
| --- | --- | --- |
|  | 2‐‐65   SAT‐‐530   * ACT‐‐   **Testing‐‐All students are tested for placement‐‐**Expanded test information/ preparation is in development.   * **Exempt**—ACCUPLACER College Math for placement into credit‐ bearing courses beyond the entry level; see below for placement information. * **Non‐exempt**‐‐ACCUPLACER Elementary Algebra   40  placement into corequisite MAT 1190 (Non‐STEM) or MAT 065(STEM)  57  placement into credit‐bearing math via ACCUPLACER College Math  **Retest** after 10 business days offered to students close to passing Elementary Algebra (50‐56) are offered an opportunity to retest  **Provide advisement re appropriate path to the following groups:**   1. Intended STEM majors with scores less than 57 in Elementary Algebra 2. Non‐STEM majors who score well in Algebra 3. Undecided students with MAT 1275 level scores or higher | |
| **PROPOSED PATHS** | **Non‐STEM Path‐‐ Quantitative Reasoning/ Statistics** | **STEM Path (Algebra/Calculus)** Depending upon program requirements |
| **Developmental/** |  |  |
| **Basic Math** | Not proficient in arithmetic— | Not proficient in arithmetic—CUNY |
|  | CUNY Math START, summer | Math START, Summer Immersion, |
|  | Immersion, BEOC (Other | BEOC, or other intervention TBD/ |
|  | alternatives may be | **Advisement required** |
|  | developed) |  |
|  |  | Not proficient in algebra—MATH |
|  |  | 065 (5 hrs/ 0 credits)/ **Advisement** |
|  |  | **required** |
|  | **Exit:** Course performance |  |
|  | including departmental or | **Exit:** Course performance + CEAFE |
|  | other common exam. | (35%) |
| **Credit Math** (All |  |  |
| courses will meet | \***Math 1190CO**Quantitative | **\*MAT 1275CO** College Algebra and |
| Pathways QR | Reasoning (MAT 1190 | Trigonometry (4 hrs., 4 credits + non‐ |
| requirement) | curriculum with required | credit coreq.) |

|  |  |  |
| --- | --- | --- |
|  | non‐credit support) | *CUNY Proficient in Elementary* |
| **OR** | *Algebra + less than 60 on* |
| **MAT 1190** Quantitative | *ACCUPLACER College‐Level Math and* |
| Reasoning | *less than 80 on Algebra I Regents* |
| **MAT 1272** Statistics (if | **OR** |
| program requires) |  |
|  | **MAT 1275** College Algebra and |
| \*Bridge to Calculus—for | trigonometry (4 hrs, 4 credits) |
| students who initially select a | *CUNY Proficient in Elementary* |
| non‐STEM path and later | *Algebra +* ***either*** *60‐79 on* |
| decide to transfer to a STEM | *ACCUPLACER College‐Level Math* ***or*** |
| program | *80‐100 on Algebra I Regents* |
|  | **MAT 1375** Pre‐Calculus (4 hrs, 4 |
|  | credits) |
|  | *CUNY Proficient in Elementary* |
|  | *Algebra + either 80‐94 on* |
|  | *ACCUPLACER College‐level Math OR* |
|  | *80‐100 on Algebra 2 Regents.* |
|  | **Mat 1475** Calculus (4 hrs. 4 credits) |
|  | *CUNY Proficient in Elementary* |
|  | *Algebra + 95 or higher on* |
|  | *ACCUPLACER College Level Math* |
|  | **MAT 1575** Calculus II (4 hrs, 4 |
|  | credits) |

\*Under development

## Corequisite Support

In consultation with the Math Department, we have determined that the most expedition way to implement corequisite support for the two existing courses that will now be gateway courses, MAT 1190 (Non‐STEM) and MAT 1275 (STEM), will be to develop lab components taught by the same teachers. It does not seem feasible to develop curriculum, hire and train facilitators, and develop a scheduling plan in the short term. For some of the same reasons, we are not attempting a cohort model, except perhaps for first semester students as part of our Learning Communities.

Furthermore, existing resources have been dedicated to preparing and supporting students in both of these courses. MAT 1190 is a recently developed course for which considerable attention has been given by the Math faculty, assisted by QR Fellows. A cohort of committed instructors of 1190 already exists, and we believe it will be possible to run pilot in Fall 2017, Spring 2018, and Summer 2018 and to offer MAT 1190 with corequisite support at

scale in Fall 2018. It was conceived as a hands‐on course and should lend itself well to an augmented version.

Two current federal grants, an MSEIP and a Title V (Opening Gateways) are directed toward instructional materials and strategies for strengthening students’ performance in MAT 1275. We envision a small pilot in the summer of 2017, a larger pilot in Fall 2017, Spring 2017, and Summer 2018, with full implementation in Fall 2018. At the same time, the course coordinators will facilitate the development of a core of engaged faculty who will continue to refine the course.

## OTHER STAKEHOLDERS

During the pilot phase several implementation teams, designated below, will convene to identify and address implementation needs, prepare informational and advisement materials, and

**Faculty in other disciplines**—Built Environment (Architecture, Construction Management and Civil Engineering Technology, Environmental Control and Facilities Management); Business (Accounting, Marketing, Hospitality Management, Health Services Administration); Computer Systems and Engineering Technology; Science (Biomedical Informatics, Chemistry, Physics), Social Science (Psychology, Sociology, Economics); Health.

## College Systems and Services

Marcela Armoza, VP for Enrollment and Student Affairs Tasha Rhodes, Registrar

Julia Jordan, Director of Faculty Commons

Karen Lundstrem, Director of Instructional Technology Tammie Cumming, Director of AIR

## Campus Advisers

Angela Kavanagh, Director New Student Center Paul Dorestant, Director SEEK

Yelena Bondar, Director ASAP

Lauri Aguirre, Director CUE/Immersion Lourdes Smith, Director Transfer Center **Academic Support providers**

Math Dept. faculty (Profs. Reitz, Singh, Poirier, Han, Benakli, Kostadinov) SEEK—Ron Platzer

ASAP—Yelena Bondar

Student Accessibility Center—John Reed Currie College Learning Center—Judy Rockway

## TIMELINE

October 2016‐February 2017 Determine proposed components of new sequences November 2016‐ Identify needs for Advisement, test prep, academic support

January 2017 Determine depts. to review Math requirements—BUS, NUR January 2017 Designate participating Stakeholders

January 2017 Analyze distribution of students across sequences February 2017 Consult with CUNY Math START

February‐March 2017 Design corequisite support

February –March 2017 Prepare information/ guidance materials for incoming first‐

year and transfer students; train advisers

Spring 2017 Departmental and Governance approval for pilot courses Spring 2017 Design Assessment plan—outcome, targets

Spring 2017 Math Department designates course coordinators, who plan

professional development for instructors

Summer 2017 Pilot +EN option for MAT 1275; analyze data

Summer 2017 Initiate Math START

Fall 2017 Pilot MAT 1190EN; expanded pilot of MAT 1275S1

Fall 2017 Implement full test prep and advisement activities Early Spring 2018 Submit proposal for full implementation

Fall 2018 Full implementation of MAT1275EN

## ASSESSMENT

Dr. Tammie Cumming, Director of the Office of Assessment and Institutional Research, will work with the Math Department in Spring 2017 to design an assessment plan for the two new augmented courses, including:

* Success in meeting learning outcomes
* Overall completion and pass rates
* Performance in subsequent math courses
* Performance in courses requiring math applications

Building on the existing Gen Ed Assessment plan, we will also assess performance across the board in the mathematics sequence. A team from the Math Department will analyze the data and propose and implement strategies for improvement.

In Fall 2018, all participants will convene to review progress and propose possible alternative modalities for the components of the sequence. The Math Department faculty and all of us hope to use this opportunity to address in fresh and informed ways problems that have plagued our math offerings for many years. The gap between the math skills demanded by our high tech programs and the level of preparation of large numbers of students who aspire to these programs has been an often insurmountable obstacle to improving retention and success. With the mandate from CUNY, the ability to bring to bear extensive data, and the talent and commitment of the math faculty and those providing academic support, we hope to offer our students significantly improved odds for success.

1Given the high fail rate in MAT 1175, we will need to continue to offer it at least through Fall 2018 for the students who need

to repeat F or D grades. We hope to be able to include some of the supports developed for MAT 1275EN.