KINGSBOROUGH COMMUNITY COLLEGE
The City University of New York

CURRICULUM TRANSMITTAL COVER PAGE

Department: **Mathematics and Computer Science**   Date: **February 5, 2018**

Title Of Course Or Degree: **Associate in Science (A.S.) in Mathematics**

Change(s) Initiated: (Please check)

- ☐ Closing of Degree
- ☐ Closing of Certificate
- ☐ New Certificate Proposal
- ☐ New Degree Proposal
- ☐ New Course
- ☐ New 82 Course
- ☐ Deletion of Course

- ☐ Change in Degree or Certificate Requirements
- ☐ Change in Degree Requirements (adding concentration)
- ☐ Change in Pre/Co-Requisite
- ☐ Change in Course Designation
- ☐ Change in Course Description
- ☐ Change in Course Title, Numbers Credit and/or Hour
- ☐ Change in Academic Policy
- ☐ Pathways Submission:
  - ☐ Life and Physical Science
  - ☐ Math and Quantitative Reasoning
  - ☐ A. World Cultures and Global Issues
  - ☐ B. U.S. Experience in its Diversity
  - ☐ C. Creative Expression
  - ☐ D. Individual and Society
  - ☐ E. Scientific World

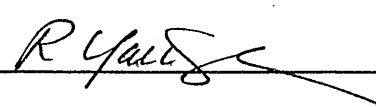☑ **Other (please describe):** Update of program learning outcomes for Mathematics

PLEASE ATTACH MATERIAL TO ILLUSTRATE AND EXPLAIN ALL CHANGES

DEPARTMENTAL ACTION

Action by Department and/or Departmental Committee, if required:

Date Approved: **February 5, 2018** Signature, Committee Chairperson: _____

I have reviewed the attached material/proposal

Signature, Department Chairperson: _____

Revised/Dec.2015/AK

DATE: February 5, 2018

TO: Spring 2018 Curriculum Committee

FROM: Department of Mathematics and Computer Science

SUBJECT: Change of Program Learning Outcomes for Mathematics A.S.

The Department of Mathematics & Computer Science is proposing to change the program learning outcomes for Mathematics:

OLD – Previous Learning Outcomes:

Upon successful completion of the Mathematics degree program requirements, graduates will:

1. demonstrate the ability to use symbolic graphical and numerical representation of mathematical ideas

2. demonstrate conceptual ability for problem-solving using arithmetic, algebraic, statistical and geometric models

3. demonstrate quantitative ability for problem-solving using arithmetic, algebraic, statistical and geometric models

4. demonstrate the ability to communicate mathematical ideas clearly

5. demonstrate the ability to estimate and check answers to mathematical problems and determining reasonableness of results

6. demonstrate a mastery of skills of differentiation and integration for entry into a third year baccalaureate program

7. demonstrate a mastery of skills for manipulating matrices and determinants

NEW – Revised Learning Outcomes:

Upon successful completion of the Mathematics degree program requirements, graduates will:

1. Assess formal logical statements for validity

2. Give proofs by direct and inductive methods

3. Solve problems using differentiation and integration

4. Test infinite series for convergence or divergence

5. Manipulate and interpret matrix notation

6. Analyze graphs for paths, circuits, and spannings

7. Communicate mathematical ideas clearly in writing

RATIONALE FOR CHANGE:

A new committee structure was formed for assessment of the A.S. Mathematics degree in the 2014-2015 academic year, with an eye towards continuous monitoring and improvements. At that time, faculty agreed to revise the program learning outcomes (PLOs), with the intention of making them more concise, concrete, and easier for all stakeholders (faculty, administrators, and students) to parse and identify. For this purpose, we have been guided by directives such as the Middle States' Standards for Accreditation, Standard 11: Educational Offerings, to develop "clearly articulated written statements of expected learning outcomes", and Standard 14: Assessment of Student Learning, that the assessment process have "sufficient simplicity, practicality, detail, and ownership to be sustainable" (Middle States Commission on Higher Education, *Characteristics of Excellence in Higher Education: Requirements of Affiliation and Standards for Accreditation*, 12th edition, revised March 2011).

Committee faculty agreed to the Revised PLOs shown above in a meeting on 3/31/15, and found that this was the best expression of the skills expected from graduating math majors, and cultivated by a curriculum that seeks to prepare students for a future baccalaureate degree in the discipline. This committee included the following faculty: Daniel Collins (chair), Stephen Majewicz, Maria Petrova, and Mei Xing. The program learning outcomes (PLOs) shown here have been used to guide assessment in the department, and have been visible in the WEAVE Online database managed by the Office of Institutional Research, Assessment, and Planning, since that time.

In accordance with the discipline, the current A.S. Mathematics assessment is quantitative in nature. That said, one of the challenges for assessment in the program is the relatively small number of students registered, taking terminal courses, and graduating each year. If we were to look at only one semester's data for a given PLO, there would not be enough data for valid inferences regarding future populations, and therefore no way to justify proposed improvements. To deal with this, the A.S. Mathematics faculty have committed to assessing all of the given PLOs on a consistent basis every semester, and in that way develop a body of data that can be used to drive improvements with confidence. Statistics and dashboard-style graphs of the findings each year from 2014-2015 on can be found in the Office of IRAP's WEAVE Online database, and have been discussed at an all-faculty department meeting at least once a semester since that time. Faculty have generally found this to be a useful and clarifying process, guided by the new PLOs identified here. Therefore, the department requests approval of the revised PLOs, and inclusion in the college catalog.