KINGSBOROUGH COMMUNITY COLLEGE
The City University of New York

CURRICULUM TRANSMITTAL COVER PAGE

Department: Math and Computer Science   Date: 2/21/2018

Title Of Course Or Degree: Calculus I - MAT 1500

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): _____

PLEASE ATTACH MATERIAL TO ILLUSTRATE AND EXPLAIN ALL CHANGES

DEPARTMENTAL ACTION

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

Date Approved: 2/21/2018   Signature, Committee Chairperson: _____

I have reviewed the attached material/proposal

Signature, Department Chairperson: R Yuus _____

Revised Dec. 2015 AK

TO: Spring 2018 Curriculum Committee

FROM: Department of Mathematics & Computer Science

DATE: 2/21/2018

RE: Change in prerequisite to Calculus I (MAT 1500)

The Department of Mathematics & Computer Science is proposing a change in prerequisite for Calculus I (MAT 1500).

FROM:

Prerequisite: MAT 1400 with a grade of "C" or better
Pre/Corequisite: MAT 1000

TO:

Prerequisite: (1) MAT 1400 with a grade of "C" or better **and** Corequisite MAT 1000; or (2) MAT 99 with a grade of "C" or better

Rationale for Change: Reconfiguration of offering to distinguish between STEM and non-STEM- oriented courses.

TO: Spring 2018 Curriculum Committee

FROM: Department of Mathematics & Computer Science

DATE: 2/21/2018

RE: Change in Number of Course Credits to Calculus I (MAT 1500)

The Department of Mathematics & Computer Science is proposing a change in number of course credits for Calculus I (MAT 1500).

FROM:

4 credits, 4 hrs

TO:

3 credits, 4 hrs. (2 lecture hrs., 2 hr. lab)

Rationale for Change: The change in number of credits reflects curricular adjustments.

COURSE SYLLABUS: Mathematics 1500

1. **DEPARTMENT, COURSE NUMBER, AND TITLE (SPEAK TO ACADEMIC SCHEDULING FOR NEW COURSE NUMBER ASSIGNMENT):**
   Department of Mathematics and Computer Science
   MAT 1500 - Calculus I.

2. **DOES THIS COURSE MEET A GENERAL EDUCATION/CUNY CORE CATEGORY?**
   - ☐ 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

   IF YES, COMPLETE AND SUBMIT WITH THIS PROPOSAL A CUNY COMMON CORE SUBMISSION FORM.

3. **DESCRIBE HOW THIS COURSE TRANSFERS (REQUIRED FOR A.S. DEGREE COURSE). IF A.A.S. DEGREE COURSE AND DOES NOT TRANSFER, JUSTIFY ROLE OF COURSE, E.G. DESCRIBE OTHER LEARNING OBJECTIVES MET:**

   Course MAT 1500 (Calculus 1) is equivalent to:

   Brooklyn College B MATH 3.3 (Calculus 1), 3credits;

   College of Staten Island B MTH 231 (Analytic Geometry and Calculus 1), 3 credits;

   New City Technical College BMA 475 (Analytic Geometry and Calculus 1) 4 credits;

   John Jay College of Criminal Justice B MAH 241 (Calculus 1), 3credits.

4. **BULLETIN DESCRIPTION OF COURSE:**
   An introduction to the calculus of algebraic functions of one variable. Limits and continuity; derivatives and slopes of graphs; analysis of motion and rates of change; rules of differentiation; higher derivatives; related rates, asymptotes; applications to graphing; maximum-minimum problems, approximation methods, antiderivatives; the definite integral; the Fundamental Theorem of Calculus; derivatives of trigonometric functions. Calculus 1 is preparation for the major courses in Mathematics, Computer Science, Physics, and several other sciences.

5. **CREDITS AND HOURS* (PLEASE CHECK ONE APPROPRIATE BOX BELOW BASED ON CREDITS):**

1-credit:	☐ 1 hour lecture
	☐ 2 hours lab/field/gym
2-credits:	☐ 2 hours lecture
	☐ 1 hour lecture, 2 hours lab/field
	☐ 4 hours lab/field
3-credits:	☐ 3 hours lecture, 1 hour lab/recitation

☒ 2 hours lecture, 2 hours lab/field	
☐ 1 hour lecture, 4 hours lab/field	
☐ 6 hours lab/field	

4-credits:	☐ 4 hours lecture
	☐ 3 hours lecture, 2 hours lab/field
	☐ 2 hours lecture, 4 hours lab/field
	☐ 1 hour lecture, 6 hours lab/field
	☐ 8 hours lab/field

More than 4-credits: ☐ Number of credits: ____ (explain mix lecture/lab below)

___ Lecture   ____ Lab

Explanation:_____

*Hours are hours per week in a typical 12-week semester

6. **NUMBER OF EQUATED CREDITS IN ITEM #5:** N/A

7. **COURSE PREREQUISITES AND COREQUISITES (IF NONE PLEASE INDICATE FOR EACH)**
   A. PREREQUISITE(S):   MAT 1400 with grade of "C" or better and MAT 1000; **or** MAT 9900 with grade of "C" or better
   B. COREQUISITE(S):
   C. PRE/COREQUISITE(S):

8. **BRIEF RATIONALE TO JUSTIFY PROPOSED COURSE TO INCLUDE:**
   A. ENROLLMENT SUMMARY IF PREVIOUSLY OFFERED AS AN 82 (INCLUDE COMPLETE 4-DIGIT 82 COURSE NUMBER): N/A
   B. PROJECTED ENROLLMENT: Approximately 100-125 students in each of fall and spring semesters; approximately 50 students in each of winter and summer modules
   C. SUGGESTED CLASS LIMITS: 30 students
   D. FREQUENCY COURSE IS LIKELY TO BE OFFERED: Fall, Spring, Summer, and Winter
   E. ROLE OF COURSE IN DEPARTMENT'S CURRICULUM AND COLLEGE'S MISSION
   Calculus is a foundation of modern mathematics and it is widely used in physics and physical sciences, modern biology, a wide variety of technical sciences, computer science, economics, and modern medicine. Knowledge of calculus is demanded by many modern sciences and technologies today. Therefore, this course is required for many majors, both at Kingsborough and at other colleges.

   Calculus 1 is the first part of a three-semester sequence of courses designed to enable students to obtain a basic knowledge of this high-level subject. As this Department's initial professional-level course in calculus, it plays an important role in the Department's curricula in Mathematics and in Computer Science.

   Mathematics 1500 is also an integral offering of the Department to help to fulfill Kingsborough's mission of specialized and general education, career development, and preparation for transfer to a four year college. Calculus 1 helps to give students the mathematical background needed to take a number of courses in other departments, especially in different fields of sciences and technology. It also helps students develop logical and analytic skills and improve their reasoning skills.

9. **LIST COURSE(S), IF ANY, TO BE WITHDRAWN WHEN COURSE IS ADOPTED (NOTE THIS IS NOT THE SAME AS DELETING A COURSE):** None

10. **IF COURSE IS AN INTERNSHIP, INDEPENDENT STUDY, OR THE LIKE, PROVIDE AN EXPLANATION AS TO HOW THE STUDENT WILL EARN THE CREDITS AWARDED. THE CREDITS AWARDED SHOULD BE CONSISTENT WITH STUDENT EFFORTS REQUIRED IN A TRADITIONAL CLASSROOM SETTING:** N/A

11. **PROPOSED TEXT BOOK(S) AND/OR OTHER REQUIRED INSTRUCTIONAL MATERIAL(S):**
Calculus Alternate 6th Ed, Larson, Hostetler, Edwards, ISBN: 0395889022.

12. **REQUIRED COURSE FOR MAJOR OR AREA OF CONCENTRATION?**

    IF YES, COURSE IS REQUIRED, SUBMIT A SEPARATE CURRICULUM TRANSMITTAL COVER PAGE INDICATING A "CHANGE IN DEGREE OR CERTIFICATE REQUIREMENTS" AS WELL AS A PROPOSAL THAT MUST INCLUDE A RATIONALE AND THE FOLLOWING ADDITIONAL PAGES: A "CURRENT" DEGREE WITH ALL PROPOSED DELETIONS (STRIKEOUTS) AND ADDITIONS (BOLDED TEXT) CLEARLY INDICATED, AND A "PROPOSED" DEGREE, WHICH DISPLAYS THE DEGREE AS IT WILL APPEAR IN THE CATALOG (FOR A COPY OF THE MOST UP-TO-DATE DEGREE/CERTIFICATE REQUIREMENTS CONTACT AMANDA KALIN, EXT. 4611).

    NYSED GUIDELINES OF 45 CREDITS OF LIBERAL ARTS COURSE WORK FOR AN ASSOCIATE OF ARTS DEGREE (A.A.), 30 CREDITS FOR AND ASSOCIATE OF SCIENCE DEGREE (A.S.), AND 20 CREDITS FOR AN APPLIED ASSOCIATE OF SCIENCE DEGREE (A.A.S.) MUST BE ADHERED TO FOR ALL 60 CREDIT PROGRAMS.

    Required for Mathematics, Computer Science, Physics, Engineering science, Chemistry, Pharmacy Transfer

13. **IF OPEN ONLY TO SELECTED STUDENTS SPECIFY POPULATION:** N/A

14. **EXPLAIN WHAT STUDENTS WILL KNOW AND BE ABLE TO DO UPON COMPLETION OF COURSE:**

Upon completion of the course students will have the basic knowledge of limits and continuity, and differentiating and integrating functions. They will be able to do the following:

Evaluate the limits of algebraic functions using different techniques.

1. Test functions for continuity.
2. Differentiate functions using definition of derivatives and rules of differentiation.
3. Differentiate composite functions and functions defined implicitly.
4. Find higher derivatives.
5. Investigate functions and sketch their graphs using differentiation.
6. Solve simple geometric, physical and optimization problems using differentiation.
7. Use differentials for approximation of values of functions.
8. Evaluate indefinite and definite integrals of some algebraic functions.
9. Find areas of some figures using integration.

15. METHODS OF TEACHING –E.G. LECTURES, LABORATORIES, AND OTHER ASSIGNMENTS FOR STUDENTS, INCLUDING ANY OF THE FOLLOWING: DEMONSTRATIONS, GROUP WORK, WEBSITE OR E-MAIL INTERACTIONS AND/OR ASSIGNMENTS, PRACTICE IN APPLICATION OF SKILLS, ETC.: Lectures and Recitations/Labs.

16. ASSIGNMENTS TO STUDENTS: Daily exercises and review.

17. DESCRIBE METHOD OF EVALUATING LEARNING SPECIFIED IN #15 - INCLUDE PERCENTAGE BREAKDOWN FOR GRADING. IF A _DEVELOPMENTAL COURSE_ INCLUDE HOW THE NEXT LEVEL COURSE IS DETERMINED AS WELL AS NEXT LEVEL PLACEMENT. Class examinations and final examination. Suggested guideline: Class exams: 50%; Final exam: 30%; Assignments: 20%.

18. TOPICAL COURSE OUTLINE FOR THE 12 WEEK SEMESTER (WHICH SHOULD BE SPECIFIC REGARDING TOPICS COVERED, LEARNING ACTIVITIES, AND ASSIGNMENTS):

Lesson	Topic	Section
1	Functions; combinations of functions	1.5
2-3	Limits: informal introduction	2.1
lab	Work on function and limits problems	
4	Finding limits; one-sided limits	2.2
5-6	Continuity; the Intermediate Value Theorem	2.3
Lab	Practice finding limits and continuity	
7	Infinite limits; vertical asymptotes	3.4
8-9	Derivatives, slopes, tangent lines	3.1
Lab	Examination I	
10-11	Velocity, acceleration, rates of change	3.2
12	Differentiation: powers, constant multiples, sums and differences	3.3
Lab	Work on rates of change and differentiation	
13	Product and quotient rules	3.4
14-15	Chain rule; general power rule	3.5
	Implicit differentiation	3.6
Lab	Work on chain rule and Implicit differentiation	
16	Related rates	3.7
17	Maxima and minima of a function on an interval	4.1
18	The Mean Value Theorem	4.2
Lab	Examination II	
19-20	Increasing and decreasing functions; the first derivative test	4.3
21	Concavity; the second derivative test	4.4
Lab	Work on the first and second derivative tests	
22	Limits at infinity; horizontal asymptotes	4.5
23-24	Curve sketching	4.6
Lab	Work on Curve sketching	
25	Maximum-minimum problems	4.7
26	Newton's Method	4.8
27	Differentials and approximation	4.9
Lab	Examination III	
28	Review: trigonometric functions	8.1
	Graphs and limits of trigonometric functions	8.2
29-30	Derivatives of trigonometric functions and applications	8.3
Lab	Work on derivatives of trigonometric functions	
31	Antiderivatives, including polynomials and powers	5.1

19. SELECTED BIBLIOGRAPHY AND SOURCE MATERIALS:

A) James Stewart, Calculus, Fourth Edition, Brooks/Cole Publishing Company.

B) Larson & Edwards, Brief Calculus, An Applied Approach, Fifth Edition, Houghton Mifflin Company.

Updated by Max Tran, 01/2018