

**LEHMAN COLLEGE
OF THE
CITY UNIVERSITY OF NEW YORK**

DEPARTMENT OF MATHEMATICS

CURRICULUM CHANGE

1. **Type of Change:** Title, description, pre/corequisite, credits, hours

2. **From:** ~~Strikethrough~~ the changes

Department(s)	Mathematics
Career	<input checked="" type="checkbox"/> Undergraduate [] Graduate
Academic Level	<input checked="" type="checkbox"/> Regular [] Compensatory [] Developmental [] Remedial
Subject Area	Mathematics
Course Prefix & Number	MAT 347
Course Title	Game Theory and Linear Programming
Description	An introduction to the mathematical theory of games of strategy. Matrix games. Optimal strategies for zero-sum two-person games. Convex sets in Euclidean n-space, systems of linear inequalities, linear programming, and the simplex method. Nperson games and non-zero-sum games.
Pre/ Co Requisites	One course in linear algebra.
Credits	3
Hours	3
Liberal Arts	<input checked="" type="checkbox"/> Yes [] No
Course Attribute (e.g. Writing Intensive, WAC, etc)	NA
General Education Component	<input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> Required <input type="checkbox"/> English Composition <input type="checkbox"/> Mathematics <input type="checkbox"/> Science <input type="checkbox"/> Flexible <input type="checkbox"/> World Cultures <input type="checkbox"/> US Experience in its Diversity <input type="checkbox"/> Creative Expression <input type="checkbox"/> Individual and Society <input type="checkbox"/> Scientific World

3. **To:** Underline the changes

Department(s)	Mathematics
Career	<input checked="" type="checkbox"/> Undergraduate [] Graduate
Academic Level	<input checked="" type="checkbox"/> Regular [] Compensatory [] Developmental [] Remedial
Subject Area	Mathematics
Course Prefix & Number	MAT 347
Course Title	Linear Programming <u>and Convex Algebraic Geometry</u>
Description	Convex sets in Euclidean n-space, systems of linear inequalities, linear programming, and the simplex method. <u>Linear matrix inequalities, spectrahedra and spectrahedral shadows, semidefinite programming. Use of computer software to solve optimization problems.</u>
Pre/ Co Requisites	<u>MAT 313</u>
Credits	<u>4</u>
Hours	<u>4</u>
Liberal Arts	<input checked="" type="checkbox"/> Yes [] No
Course Attribute (e.g. Writing Intensive, WAC, etc)	NA
General Education Component	<input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> Required <input type="checkbox"/> English Composition <input type="checkbox"/> Mathematics <input type="checkbox"/> Science <input type="checkbox"/> Flexible <input type="checkbox"/> World Cultures <input type="checkbox"/> US Experience in its Diversity <input type="checkbox"/> Creative Expression <input type="checkbox"/> Individual and Society <input type="checkbox"/> Scientific World

4. **Rationale (Explain how this change will impact the learning outcomes of the department and Major/Program):**

MAT 347 has not been offered by our department in many years. This new description better describes the material that will be covered, emphasizing “Convex Algebraic Geometry”, which is a modern way to refer to the subject, and de-emphasizing applications to game theory, which may not be covered, in order to prioritize the use of computer software together with the theoretical components of instruction. In order to fully integrate the theoretical (mathematical) and practical (programming) aspects of this course, 4 hours / 4 credits of instruction are required. Note that the prerequisite has not changed; MAT 313 is our department’s course in Linear Algebra.

5. **Date of departmental approval:** March 3, 2022

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DEPARTMENT OF MATHEMATICS

CURRICULUM CHANGE

1. **Type of change:** New Course

2.

Department(s)	Mathematics
Career	<input checked="" type="checkbox"/> Undergraduate [] Graduate
Academic Level	<input checked="" type="checkbox"/> Regular [] Compensatory [] Developmental [] Remedial
Subject Area	Mathematics
Course Prefix & Number	MAT 447
Course Title	Geometric Design and Optimization with 3D printing
Description	Continuation of MAT 347. Project-oriented applications of linear programming, semidefinite programming, and convex algebraic geometry to geometric design and optimization. Students will use computer software to design, prototype, print, and test 3D models using fused filament fabrication 3D printers.
Pre/ Co Requisites	MAT 347
Credits	4
Hours	4
Liberal Arts	<input checked="" type="checkbox"/> Yes [] No
Course Attribute (e.g. Writing Intensive, WAC, etc)	NA
General Education Component	<input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> Required <input type="checkbox"/> English Composition <input type="checkbox"/> Mathematics <input type="checkbox"/> Science <input type="checkbox"/> Flexible <input type="checkbox"/> World Cultures <input type="checkbox"/> US Experience in its Diversity <input type="checkbox"/> Creative Expression <input type="checkbox"/> Individual and Society <input type="checkbox"/> Scientific World

3. Rationale:

The Math Department wishes to incorporate 3D printing technology and experiential learning to enhance instruction, following ample pedagogical evidence of the benefits of these techniques. Visualization and spatial reasoning contribute fundamentally to the learning process, especially in Mathematics. Working in groups on specific geometric design and optimization problems, students will learn how to combine their mathematical knowledge of optimization techniques and computer programming skills to solve simple versions of real-world manufacturing problems. Finally, experience with 3D printing is an increasingly desirable skill for job applicants in several industries.

4. Learning Outcomes (By the end of the course students will be expected to):

1. Solve basic problems of geometric optimization and design using mathematical tools from Convex Algebraic Geometry and computer software
2. Manufacture simple 3D models using fused filament fabrication 3D printers
3. Solve simple real-life optimization and manufacturing problems with 3D printing
4. Test printed 3D models to develop improved versions closer to optimal solutions
5. Complete projects in small groups to better understand and appreciate course content.

5. Date of Departmental Approval: March 3, 2022