LEHMAN COLLEGE
OF THE
CITY UNIVERSITY OF NEW YORK

DEPARTMENT OF CHEMISTRY

CURRICULUM CHANGE

1. **Type of Change:** Change in course title, course description, pre/corequisites

2. **From:**

Department(s)	Chemistry
Career	[X] Undergraduate [ ] Graduate
Academic Level	[X] Regular [ ] Compensatory [ ] Developmental [ ] Remedial
Subject Area	Chemistry
Course Prefix & Number	CHE 342
Course Title	Physical Chemistry ~~Lecture I~~
Description	~~Fall term only. An in-depth study of thermodynamics, states of matter, statistical thermodynamics, kinetics, and an introduction to quantum mechanics. The relation between experiment and theory will be emphasized. Note: This course meets the requirements of the A.C.S.-certified B.S. in chemistry~~
Pre/ Co Requisites	PREREQ: CHE 168~~-169~~, PHY 169, and MAT 176
Credits	3
Hours	3
Liberal Arts	[X] Yes [ ] No
Course Attribute (e.g. Writing Intensive, WAC, etc)	
General Education Component	__X_ Not Applicable ____ Required ____ English Composition ____ Mathematics ____ Science ____ Flexible ____ World Cultures ____ US Experience in its Diversity ____ Creative Expression ____ Individual and Society ____ Scientific World

3. **To:**

Department(s)	Chemistry
Career	[X] Undergraduate [ ] Graduate
Academic Level	[X] Regular [ ] Compensatory [ ] Developmental [ ] Remedial
Subject Area	Chemistry
Course Prefix & Number	CHE 342
Course Title	Physical Chemistry Course in Quantum Chemistry
Description	Molecular theory of chemistry with principles and applications including quantum mechanics, molecular structure and spectroscopy
Pre/ Co Requisites	PREREQ: CHE 168, PHY 169, and MAT 176
Credits	3
Hours	3
Liberal Arts	[X] Yes [ ] No
Course Attribute (e.g. Writing Intensive, WAC, etc)	
General Education Component	_X__ Not Applicable ____ Required ____ English Composition ____ Mathematics ____ Science ____ Flexible ____ World Cultures ____ US Experience in its Diversity ____ Creative Expression ____ Individual and Society ____ Scientific World

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

The Chemistry Department has decided to formally separate the Physical Chemistry concepts of Thermodynamics, Kinetics and Quantum Mechanics into 2 distinct courses. CHE 342 will henceforth be the course focused on Quantum Mechanics and CHE 344 will henceforth be the course focused on Thermodynamics and Kinetics. This requires a change to the course title and course description in both cases.

In addition, the Chemistry Department no longer requires students who take CHE 342 to take CHE 169 (General Chemistry Laboratory II) as a pre-requisite course. CHE 169 was required as a pre-requisite in the past because it was a co-requisite to CHE 168 (General Chemistry Lecture I). CHE 168 can now be taken independently of CHE 169 and students require only the knowledge from the CHE 168 lecture course for CHE 342.

5. **Date of departmental approval:** October 31, 2016

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1. **Type of Change:** Change in course title, course description, pre/corequisites

2. **From:**

Department(s)	Chemistry
Career	[X] Undergraduate [ ] Graduate
Academic Level	[X] Regular [ ] Compensatory [ ] Developmental [ ] Remedial
Subject Area	Chemistry
Course Prefix & Number	CHE 344
Course Title	Physical Chemistry ~~Lecture II~~
Description	~~Spring term only. Continuation of CHE 342.~~
Pre/ Co Requisites	PREREQ: ~~CHE 342~~
Credits	3
Hours	3
Liberal Arts	[X] Yes [ ] No
Course Attribute (e.g. Writing Intensive, WAC, etc)	
General Education Component	__X_ Not Applicable ____ Required ____ English Composition ____ Mathematics ____ Science ____ Flexible ____ World Cultures ____ US Experience in its Diversity ____ Creative Expression ____ Individual and Society ____ Scientific World

3. **To:**

Department(s)	Chemistry
Career	[X] Undergraduate [ ] Graduate
Academic Level	[X] Regular [ ] Compensatory [ ] Developmental [ ] Remedial
Subject Area	Chemistry
Course Prefix & Number	CHE 344
Course Title	Physical Chemistry Course in Kinetics and Thermodynamics
Description	Selected topics drawn from thermodynamics, states of matter, statistical thermodynamics and kinetics with an emphasis on the relation between experiment and theory.
Pre/ Co Requisites	PREREQ: CHE 168, PHY 169, and MAT 176
Credits	3
Hours	3
Liberal Arts	[X] Yes [ ] No
Course Attribute (e.g. Writing Intensive, WAC, etc)	
General Education Component	__X_ Not Applicable ____ Required ____ English Composition ____ Mathematics ____ Science ____ Flexible ____ World Cultures ____ US Experience in its Diversity ____ Creative Expression ____ Individual and Society ____ Scientific World

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

The Chemistry Department has decided to formally separate the Physical Chemistry concepts of Thermodynamics, Kinetics and Quantum Mechanics into 2 distinct courses. CHE 342 will henceforth be the course focused on Quantum Mechanics and CHE 344 will henceforth be the course focused on Thermodynamics and Kinetics. This requires a change to the course title and course description in both cases.

In addition, the Chemistry Department no longer requires students who take CHE 344 to take CHE 342 as a pre-requisite course. Instead the department requires students to

take CHE 168, PHY 169 and MAT 176 to acquire the knowledge required to succeed in CHE 344. These are the same pre-requisite courses that are going to be required for CHE 342.

5. **Date of departmental approval:** October 31, 2016

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DEPARTMENT OF CHEMISTRY

CURRICULUM CHANGE

1. **Type of Change:** Change in course description and pre/corequisites.

2. **From:**

Department(s)	Chemistry
Career	[X] Undergraduate [ ] Graduate
Academic Level	[X] Regular [ ] Compensatory [ ] Developmental [ ] Remedial
Subject Area	Chemistry
Course Prefix & Number	CHE 442
Course Title	Inorganic Chemistry
Description	~~Developments in modern chemical theories in the interpretation and explanation of the properties of, and relationships existing between, the elements and their compounds.~~
Pre/ Co Requisites	PREREQ: CHE 234. PRE-or COREQ: ~~CHE 334 or 344~~
Credits	3
Hours	3
Liberal Arts	[X] Yes [ ] No
Course Attribute (e.g. Writing Intensive, WAC, etc)	
General Education Component	__X_ Not Applicable ____ Required ____ English Composition ____ Mathematics ____ Science ____ Flexible ____ World Cultures ____ US Experience in its Diversity ____ Creative Expression ____ Individual and Society ____ Scientific World

3. **To:**

Department(s)	Chemistry
Career	[X] Undergraduate [ ] Graduate
Academic Level	[X] Regular [ ] Compensatory [ ] Developmental [ ] Remedial
Subject Area	Chemistry
Course Prefix & Number	CHE 442
Course Title	Inorganic Chemistry
Description	Inorganic chemical principles including concepts of bonding, intermolecular forces, acid-base behavior, and reduction-oxidation properties.
Pre/ Co Requisites	PREREQ: CHE 234. PRE-or COREQ: CHE 249
Credits	3
Hours	3
Liberal Arts	[X] Yes [ ] No
Course Attribute (e.g. Writing Intensive, WAC, etc)	
General Education Component	_X__ Not Applicable ____ Required ____ English Composition ____ Mathematics ____ Science ____ Flexible ____ World Cultures ____ US Experience in its Diversity ____ Creative Expression ____ Individual and Society ____ Scientific World

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

The Chemistry Department no longer requires students who take CHE 442 to take CHE 332 (Intro to PChem) or CHE 342 (PChem) as a pre or co-requisite, instead the department would require students to take CHE 249 (Quantitative Analysis) as a pre or co-requisite course. Based on the changes to the course content (as outlined below) the prior knowledge required to be successful in CHE 442 is learned in CHE 234 (Organic

Chemistry 2, the current pre-requisite course) and CHE 249 (the newly added pre or co-requisite course).

This is the first course in the Advanced Topics of Inorganic Chemistry series offered by the department to comply with the requirements of the American Chemical Society. In this capacity CHE 442 will focus on expanding the general chemistry background of students into the fundamental area of Inorganic Chemistry. In order to comprehend and succeed in the second semester of the Advanced Inorganic Chemistry courses, it is crucial to tie the fundamental knowledge of Chemistry to the more advanced chemical principles in Inorganic Chemistry. In this course the knowledge required for success will be built by meeting the learning objectives below.

CHE 442 Learning Objectives:

- State and apply the major basic concepts of inorganic chemistry.
- Explain the periodicity of chemical and physical properties.
- Explain how the nature of chemical bonding influences the molecular structure.
- Recognize the principles of the reduction-oxidation processes and differentiate these from other chemical processes.
- Differentiate between the main types of chemical reactions.
- Describe the Main Group Elements. Synthesis, structure, physical properties, variations in bonding motifs, acid - base character, and reactivities of the elements and their compound
- Differentiate between normal inorganic compounds and coordinative complexes.

This change is required to comply with the current requirements of the American Chemical Society.

5. **Date of departmental approval:** October 31, 2016

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CURRICULUM CHANGE

1. **Type of Change:** Change in course title, course description, number of course credits, number of course hours and pre/corequisites.

2. **From:**

Department(s)	Chemistry
Career	[X] Undergraduate [ ] Graduate
Academic Level	[X] Regular [ ] Compensatory [ ] Developmental [ ] Remedial
Subject Area	Chemistry
Course Prefix & Number	CHE 443
Course Title	Inorganic Chemistry ~~Laboratory~~
Description	~~Inorganic synthesis and characterization of compounds by instrumental and other modern techniques.~~
Pre/ Co Requisites	PREREQ: CHE ~~234-~~235. PRE-or COREQ: ~~CHE 344 and 442~~
Credits	~~1~~
Hours	~~2~~
Liberal Arts	[X] Yes [ ] No
Course Attribute (e.g. Writing Intensive, WAC, etc)	
General Education Component	__X_ Not Applicable ____ Required ____ English Composition ____ Mathematics ____ Science ____ Flexible ____ World Cultures ____ US Experience in its Diversity ____ Creative Expression ____ Individual and Society ____ Scientific World

3. **To:**

Department(s)	Chemistry
Career	[X] Undergraduate [ ] Graduate
Academic Level	[X] Regular [ ] Compensatory [ ] Developmental [ ] Remedial
Subject Area	Chemistry
Course Prefix & Number	CHE 443
Course Title	Advanced Inorganic Chemistry
Description	Advanced studies in modern inorganic chemical theories on the interpretation and explanation of the properties, and relations between the elements, their compounds and structures.
Pre/ Co Requisites	PREREQ: CHE 235 and 442. PRE-or COREQ: CHE 342
Credits	5
Hours	8 (2 lecture, 6 lab)
Liberal Arts	[X] Yes [ ] No
Course Attribute (e.g. Writing Intensive, WAC, etc)	
General Education Component	__X_ Not Applicable ____ Required ____ English Composition ____ Mathematics ____ Science ____ Flexible ____ World Cultures ____ US Experience in its Diversity ____ Creative Expression ____ Individual and Society ____ Scientific World

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

The Chemistry Department no longer requires students who take CHE 443 to take CHE 234 (Organic Chemistry 2) as a pre-requisite course. CHE 234 is the pre-requisite course to CHE 442 (Inorganic Chemistry), which we would like to change from a pre or co-requisite course to a pre-requisite course. Based on the changes to the course content outlined below the prior knowledge required to be successful in CHE 443 is learned in CHE 235 (Organic Chemistry 2 lab, the current pre-requisite course), CHE 442 (Inorganic Chemistry, the newly added pre-requisite course) and CHE 342

(Physical Chemistry course in Quantum Chemistry). CHE 342 replaces the original CHE 344 pre/co-requisite based on the changes to the CHE 342 and CHE 344 Physical Chemistry courses (see separate curriculum proposals).

CHE 443 will be transformed into the second semester of the Advanced Topics of Inorganic Chemistry to meet the demands of the American Chemical Society. CHE 443 will be an "In-Depth" course with a focus on extending the knowledge acquired in the first semester CHE 442 course and expanding into the laboratory arena.

The department currently teaches 2 Upper Level "In-Depth" Courses that are comprised of both a lecture and laboratory component, and in both cases these courses were established as 5 credit courses comprised of 2 hours of lecture instruction and 6 hours of laboratory instruction. To successfully accommodate both the depth and amount of content covered in CHE 443 and comply with the current model for Upper Level "In-Depth" courses already in existence, the department would like to change CHE 443 from a 1-credit 2-hour laboratory course to a 5-credit, 8-hour course comprised of 2 hours of lecture instruction and 6 hours of laboratory instruction.

In CHE 443 the "In-Depth" knowledge required will be built by meeting the learning objectives below.

CHE 443 Learning Objectives: SWBAT

For the lecture component:

- State and apply the major basic concepts of inorganic chemistry.
- Explain Atomic Structure Spectra and orbitals, ionization energy, electron affinity, shielding and effective nuclear charge
- Describe Covalent Molecular Substances. Geometries (symmetry point groups), valence bond theory (hybridization, σ, π , δ bonds), molecular orbital theory (homo and heteronuclear diatomics, multi - centered MO, electron -deficient molecules, π-donor and acceptor ligands).
- Apply the concepts of group theory in the spectroscopy of inorganic molecules.
- Explain the structure of the inorganic solids.
- Describe the structure of coordination compounds, to write the chemical formulas of these and to know the main theories which explain the bonding in complexes and electronic spectra.
- Describe Organometallic Chemistry. Metal carbonyls, hydrocarbon and carbocyclic ligands, 18-electron rule (saturation and unsaturation), synthesis and properties, patterns of reactivity (substitution, oxidative addition and reductive elimination, insertion and de-insertion, nucleophilic attack on ligands, isomerization, transmetallation, stereochemical nonrigidity).

For the laboratory component:

- Prepare simple inorganic compounds that have various applications.
- Determine if a reaction has gone to completion.
- Write a chemical equation that represents a chemical reaction for the preparation of a compound;

- Represent the structure of a prepared compound.
- Write a scientific report that includes the interpretation of the experimental data.

This change is required to comply with the current requirements of the American Chemical Society.

5. **Date of departmental approval:** October 31, 2016