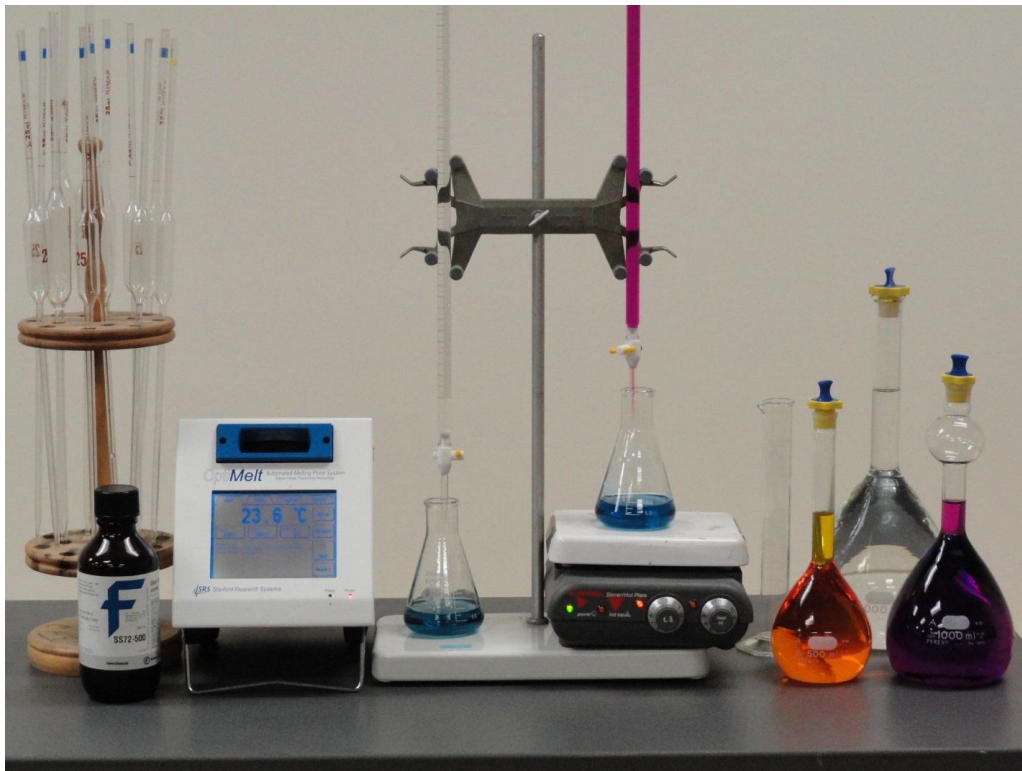


STUDENT HANDBOOK
BACHELOR OF SCIENCE IN CHEMISTRY



Department of Chemistry
Northeastern Illinois University
5500 N. St. Louis Avenue
Chicago, IL 60625

Learn in the city.
Lead in the world.



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GENERAL INFORMATION

The mission of the Chemistry Department is to become well known in the Chicago-land area for its innovative teaching and research scholarship. Its strong B.S. and M.S. programs prepare students for careers in chemical industry (pharmaceutical, Cosmetics, food, environmental, materials, etc.). The curriculum also provides an appropriate background for students planning to attend graduate or professional schools in chemistry (Ph.D. programs), medicine, dentistry, pharmacy, and other professional health fields.

The strength of the Chemistry Department is demonstrated by the placement of our majors into the workforce shortly after graduation as well as their acceptance into graduate and professional programs at highly regarded institutions across the country. For example, Max Goldmeier (B.S. December, 2012) is employed at Spherotech (Lake Forest, IL) synthesizing polymeric microparticles. Taral Patel (M.S. December, 2012) is employed at SA Analytical, LLC (Mundelein, IL) quantifying active ingredient in pharmaceutical products. Balamani Sittampalli (M.S. December 2010) is employed at Harvard University-Neurology Department (Cambridge, MA) developing and validating methods to determine chemicals in brain samples. Mark Majewski (M.S. May 2010) is pursuing a Ph.D. in Chemistry at The University of Notre Dame (Notre Dame Indiana). Sarah Vorpahl (B.S. December, 2011) has entered a Ph.D. program in Chemistry at the University of Washington (Seattle, Washington). Sarah also received a prestigious Advanced Materials for Energy Fellowship upon admission to the program. Steven Jerome (B.S. May, 2010) is pursuing a Ph.D. in Chemistry at Columbia University (New York, New York). In May 2011, Steven received a National Science Foundation (NSF) Graduate Research Award. Umesh Chaudhary (B.S. May, 2011) and Fernando Tobias (B.S. May, 2011) have also recently entered Ph.D programs in chemistry at Iowa State University (Ames, IA) and the University of Illinois at Chicago, respectively. Alexandra Sakols (B.S. May, 2011) is pursuing a graduate degree in Forensics Science at Florida International University (Fort Lauderdale, FL). Ariadna Martinez (B.S. May 2011) and Ian Karall (B.S. May, 2011) are pursuing Pharm. D programs at DePaul University (Chicago, IL) and Roosevelt University (Chicago, IL), respectively. Huong Le (B.S. May 2010) is continuing a Doctor of Dentistry program at The Ohio State University (Columbus, OH). Linh Le (B.S. May, 2011) is pursuing a graduate degree in nursing at the University of Illinois (Champaign, IL).

The Chemistry Department is proud of the success of all of our graduates and strives to continue designing new coursework and programs to help NEIU students achieve their educational and career goals.

STUDENT ADVISING

Upon or prior to declaration of major, student must meet with one of the following Chemistry Department Undergraduate Advisors to **declare a major or minor in Chemistry**:

Dr. Ken Nicholson

Telephone (773) 442-5691

[E-mail: K-Nicholson@neiu.edu](mailto:K-Nicholson@neiu.edu)

Dr. Stefan Tsonchev Telephone (773) 442-5573 [E-mail: S-Tsonchev@neiu.edu](mailto:S-Tsonchev@neiu.edu)
Dr. Tom Weaver Telephone (773) 442-4679 [E-mail: T-Weaver@neiu.edu](mailto:T-Weaver@neiu.edu)

Student must fill out the “Declaration of Major or Minor Form”. These forms are available in the Chemistry Department office located in the Bernard Brommel Hall, room BBH-214H. To obtain a copy of the form, please contact the office manager Kristin Wilkens at (773) - 442-5670 or KL-Wilkens@neiu.edu. After declaring a major or minor, student should obtain approval for major or minor courses from the department advisor before beginning his/her study.

Transfer students majoring in chemistry are expected to contact department advisor immediately so that their transfer credits may be evaluated and an appropriate program of study developed. Transfer students must take a minimum of 12 credit hours in chemistry, including three 300-level chemistry courses at Northeastern Illinois University. Transfer credit within the major will be given for grades of “C” or better.

At the end of the junior year, students should check deadlines for filing graduation application forms. Students are responsible for meeting all university and department graduation requirements. Two semesters prior to graduation, students are required to fill out major forms that must be approved by an advisor.

REGISTRATION FOR CHEMISTRY COURSES

Students may register online for Chemistry courses for which prerequisites have been met during advance and late registration. If a prerequisite was taken elsewhere, registration authorization will be required from the faculty or student advisor before he/she can register. It is important that transfer students who have not had their courses evaluated by the Chemistry Department advisor do so prior to registering. Note that a student may advance register for a course while enrolled in the prerequisite course, but must complete the prerequisite with a “C” or better to remain registered.

Chemistry courses are designed to be taken in sequence. Students will not be permitted to register for courses if they do not have credit for the required prerequisites. Undergraduate students are encouraged to participate in research programs with faculty members and may take CHEM-305, Independent Study in Chemistry, 3 cr. and CHEM-399, Research in Chemistry, 3 cr. for that purpose. Internship with local chemical industries and laboratories are also encouraged through CHEM-365, Internship in Chemistry II, 6 cr. please consult with the undergraduate advisor concerning these courses.

Students should also be aware of the University requirements for the Bachelor’s degree.

REQUIRED COURSES FOR BACHELOR OF SCIENCE DEGREE IN CHEMISTRY

| Required Courses: | | Cr. Hours |
|-------------------|---|--------------|
| *CHEM 211 | General Chemistry I | 5 cr. |
| *CHEM 212 | General Chemistry II | 4 cr. |
| CHEM 213 WIP | Quantitative Analysis | 5 cr. |
| **CHEM 231 | Organic Chemistry I | 4 cr. |
| **CHEM 232 | Organic Chemistry II | 4 cr. |
| ***CHEM 311 | Physical Chemistry I | 4 cr. |
| ***CHEM 312 | Physical Chemistry II | 4 cr. |
| CHEM 330 | Instrumental Analysis: Spectroscopy | 4 cr. |
| OR | | |
| CHEM 331 | Instrumental Analysis: Quantitative Methods | 4 cr. |
| CHEM 391 | Chemistry Capstone Seminar | 3 cr. |

Electives: 6-8 cr. hours for a total of 43-45 cr. hours.

Two electives chosen from the following:

| | | |
|-----------|---|-------|
| CHEM 316 | Inorganic Chemistry | 4 cr. |
| CHEM 318 | Industrial Chemistry | 3 cr. |
| CHEM 319 | Chemical Aspects of Environmental Chemistry | 3 cr. |
| CHEM 320 | Industrial Aspects of Environmental Chemistry | 3 cr. |
| CHEM 330 | Instrumental Analysis: Spectroscopy | 4 cr. |
| CHEM 331 | Instrumental Analysis: Quantitative Methods | 4 cr. |
| CHEM 332 | Identification of Organic Compounds | 4 cr. |
| CHEM 347 | Advanced Organic Chemistry: Polyfunctional Compounds | 3 cr. |
| CHEM 348 | Advanced Organic Chemistry: Bio-Organic Compounds | 3 cr. |
| CHEM 349 | Organic Synthesis | 3 cr. |
| CHEM 350 | Principles of Toxicology | 3 cr. |
| CHEM 353 | Principles of Pharmacology | 3 cr. |
| CHEM 357 | Chemical Kinetics | 3 cr. |
| OR | <i>Any other 300 level chemistry course approved by Dept.</i> | |

*CHEM-260, General Chemistry I Seminar, and CHEM-261, General Chemistry II Seminar are strongly recommended to be taken concurrently with CHEM-211 and CHEM-212, respectively.

**CHEM-262, Organic Chemistry I Seminar, and CHEM-263, Organic Chemistry II Seminar are strongly recommended to be taken concurrently with CHEM-231 and CHEM-232, respectively.

***CHEM-360, Physical Chemistry I Seminar, and CHEM-361, Physical Chemistry II Seminar are strongly recommended to be taken concurrently with CHEM-311 and CHEM-312 respectively.

Cognate Courses:

| | | |
|----------|------------------------------------|---------------|
| MATH 187 | Calculus I | 4 cr. |
| MATH 202 | Calculus II | 4 cr. |
| PHYS 203 | Physics I Laboratory | 1 cr. |
| PHYS 204 | Physics II Laboratory | 1 cr. |
| PHYS 206 | Physics with Calculus I <i>or</i> | |
| PHYS 201 | College Physics I | 3 cr. |
| PHYS 207 | Physics with Calculus II <i>or</i> | |
| PHYS 202 | College Physics II | 3 cr. |
| | Total | 16 cr. |

*PHYS 206 and PHYS 207 are strongly recommended for all chemistry majors and required for those in the A.C.S. approved program.

**AMERICAN CHEMICAL SOCIETY BACHELOR OF SCIENCE DEGREE IN CHEMISTRY
CONCENTRATION**

Graduating majors may receive a certificate stating that they have completed the program which meets the ACS standards for Professional Training if they fulfill the following requirements:

Take PHYS-206 as prerequisite for CHEM-311.

Take PHYS-207 as prerequisite for CHEM-312.

Take CHEM-311 and CHEM-312 during the junior year.

CHEM-316, CHEM-330, CHEM-331, CHEM-347 and CHEM-348 are required.

Two additional 300-level electives must then be selected.

Completion of this program requires a minimum of 50 cr. in chemistry with a minimum grade point average of 3.0 and no chemistry grades below C in any required course.

**TRANSFER OF COLLEGE CREDIT FOR STUDENTS WITH FOREIGN CREDENTIALS -
CHEMISTRY POLICY**

Courses from foreign colleges and universities must have been completed at the appropriate level in order to be eligible for transfer credit consideration. An evaluation of transfer credits is prepared by the university's Office of Admission for all transfer students admitted to Northeastern. This evaluation statement should be presented to the chemistry advisor at the time the student declares his/her major.

Students should request a departmental level evaluation as soon as possible after being admitted to the University. Courses accepted by the University do not necessarily meet specific program requirements for the bachelor's degree in chemistry. Coursework

transferred for credit in the chemistry major is subject to approval by the chemistry advisors.

Students with foreign credentials must take a minimum of the following five courses in order to earn a bachelor's degree in chemistry:

| | | |
|----------|---|-------|
| CHEM 213 | WIP: Quantitative Analysis | 5 cr. |
| CHEM 232 | Organic Chemistry II | 4 cr. |
| CHEM 311 | Physical Chemistry I | 4 cr. |
| CHEM 312 | Physical Chemistry II | 4 cr. |
| CHEM 330 | Instrumental Analysis: Spectroscopy | 4 cr. |
| CHEM 331 | Instrumental Analysis: Quantitative Methods | 4 cr. |

Additional coursework may be required in chemistry, mathematics or physics.

RECOMMENDED COURSE SCHEDULE SUGGESTIONS FOR BACHELOR OF SCIENCE DEGREE IN CHEMISTRY

The answer is absolutely yes to the question on the practicality of a diligent student who is full time to finish in 4 years. Below is a program suggestion that can lead to a four year graduation. According to the proposed program, chemistry majors must take both general education courses and chemistry required courses once in their freshman year. Students enrolling in general education courses only in their first two years will put them at least two years behind. In addition, it will take at least another year for students who have to take three math development courses (MATH-090, MATH-091, and MATH-092) and three reading development courses (READ-115, READ-116, and READ-117). In other words, it takes them a total of at least seven years to finish.

Freshman year:

| | First Semester | | Second Semester |
|----------|-----------------------------|----------|-----------------------------|
| CHEM 211 | General Chemistry I | CHEM 212 | General Chemistry II |
| MATH 107 | Calculus I | MATH 202 | Calculus II |
| | General Education course(s) | | General Education course(s) |

Students who are not ready for MATH-107 should take MATH-106 Precalculus Mathematic.

Sophomore year:

| | First Semester | | Second Semester |
|----------|----------------------------|----------|------------------------|
| CHEM 213 | WIP: Quantitative Analysis | CHEM 232 | Organic Chemistry II |

| | | | |
|-----------|-----------------------------|-----------|-----------------------------|
| CHEM 231 | Organic Chemistry I | PHYS 204 | Physics II Laboratory |
| PHYS 203 | Physics I Laboratory | *PHYS 207 | Physics with Calc. II |
| PHYS 206 | Physics with Calculus I | OR | |
| OR | | PHYS 202 | College Physics II |
| PHYS 201 | College Physics I | | General Education course(s) |
| | General Education course(s) | | |

*Physics with Calculus is strongly recommended and required for those in the ACS program.

Junior year:

| | First Semester | | Second Semester |
|----------|---|----------|-------------------------------------|
| CHEM 311 | Physical Chemistry I | CHEM 312 | Physical Chemistry II |
| CHEM 330 | Instrumental Analysis: Quantitative Methods | CHEM 330 | Instrumental Analysis: Spectroscopy |
| | General Education course(s) | | General Education course(s) |

CHEM-316: Inorganic Chemistry should be taken the summer after the junior year.

Senior year:

| | First Semester | | Second Semester |
|-----------|-----------------------------|-----------|-----------------------------|
| CHEM 391 | Chemistry Capstone Seminar | 300 Level | Chemistry Elective |
| 300 Level | Chemistry Elective | | General Education course(s) |
| | General Education course(s) | | |

Important Information:

(1) Chemistry courses must be taken in proper sequence. Students should not register for courses for which they do not have the required prerequisites. Grades of "C" or better are required in all chemistry courses counted toward the major.

(2) The minimum requirement for a degree in chemistry requires 21 or 22 hours at the 300 level.

(3) The NEIU degree requirement is 24 hours at the 300 level. Any extra hours do not need to be in chemistry

Juniors and seniors are encouraged to contact faculty members regarding independent study or research projects. However, registration in independent study requires mutual consent of both the students and faculty member.

Chemistry majors who are planning to attend graduate school should take the following courses as part of their undergraduate program: CHEM-330 Instrumental Analysis: Spectroscopy; CHEM-331 Instrumental Analysis: Quantitative Methods; CHEM-316 Inorganic Chemistry; and CHEM-347 Advanced Organic Chemistry: Polyfunctional Compound and CHEM-348 Advanced Organic Chemistry: Bioorganic Compounds. These courses are also recommended by the American Chemical Society for students planning careers in industry. However, students should take as many of these courses as possible in order to become successful in the job market.

SUGGESTED COURSES FOR STUDENTS WHO ARE INTENDED TO PURSUE THEIR CAREER IN THE ALLIED HEALTH SCIENCES FIELDS

Students preparing for careers in chemistry may consider admission into a pharmacy, medicine and dentistry. The undergraduate courses required for admission into these health profession careers vary significantly from one institution to the next. However, the following are the expected courses for the standardized admission Tests (PCAT, MCAT and DAT):

Pre-Pharmacy

| | |
|---|--------------------------------|
| English I & II | ENGL 101 & 102 |
| Ethics | PHIL 213 |
| Speech | CMT COMM 210 or 213 |
| | |
| General Biology I & II | BIO 201 & 202 |
| Anatomy & Physiology | BIO 327 & 360 |
| General Chemistry I & II | CHEM 211 & 212 |
| | |
| Organic Chemistry I & II | CHEM 231 & 232 |
| Advanced Organic Chemistry: Polyfunctional Compounds | CHEM 347 |
| College Physics I & II with Physics I & II Laboratories | PHYS (201 & 203) & (202 & 204) |
| Calculus I | MATH 167 or 187 |
| Economics | ECON 215 or 217 |

Pre-Medicine

| | |
|--|--------------------------|
| General Biology I & II | BIO 201 & 202 |
| Cell Biology | BIO 301 |
| General Genetics | BIO 303 |
| Biochemistry or Advanced Organic Chemistry: Bioorganic Compounds | BIO 362 or CHEM 348 |
| General Chemistry I & II | CHEM 211 & 212 |
| Organic Chemistry I & II | CHEM 231 & 232 |
| Advanced Organic Chemistry: Polyfunctional Compounds | CHEM 347 |
| College Physics I & II with Physics I & II Laboratories | PHYS 201, 202, 203 & 204 |

Pre-Dentistry

| | |
|------------------------|---------------------|
| English I & II | ENGL 101 & 102 |
| Speech | CMT COMM 210 or 213 |
| General Biology I & II | BIOL 201 & 202 |
| Anatomy & Physiology | BIO 327 & 360 |

| | |
|---|-----------------------------------|
| Microbiology | BIO 341 |
| General Chemistry I & II | CHEM 211 & 212 |
| Organic Chemistry I & II | CHEM 231 & 232 |
| Advanced Organic Chemistry: Polyfunctional Compounds | CHEM 347 |
| Biochemistry or Advanced Organic Chemistry: Bioorganic Compounds | BIO 362 or CHEM 348 |
| College Physics I & II with Physics I & II Laboratories | PHYS (201 & 203) & (202 & 204) |

Allied health science fields look very strongly at your knowledge of general Chemistry, Organic Chemistry and Physics because they do not have these subjects in their curriculum, but they expect you to know these subjects well prior to admission. In addition, at the allied health science fields, chemistry majors do well or better than majors in other fields.

MINOR IN CHEMISTRY

Required Courses:

| | | |
|----------|----------------------------|--------|
| CHEM 211 | General Chemistry I | 5 cr. |
| CHEM 212 | General Chemistry II | 4 cr. |
| CHEM 213 | WIP: Quantitative Analysis | 5 cr. |
| CHEM 231 | Organic Chemistry I | 4 cr. |
| CHEM 232 | Organic Chemistry II | 4 cr. |
| | Total | 22 cr. |

Any substitutions require written approval by the chemistry advisor. Transfer students must take a minimum 9 credit hours in chemistry at Northeastern to complete chemistry minor. These courses must be approved by the chemistry advisor.

GRADUATION INSTRUCTIONS FOR THE CHEMISTRY MAJORS

In order to file for graduation, you must:

1. Be an officially declared chemistry major.
2. Obtain an application for graduation from the Office of Enrollment Services
3. Obtain an Academic Course Record for the major from the Chemistry Department office, and an Academic Course Record form for the minor from your minor department, if you have a minor.
4. Make an appointment with the chemistry department advisor. Bring the completed form along with a copy of your transfer evaluation (if you are a transfer student)
5. If you have a minor, complete the Academic Course Record form for your minor and have it approved by the advisor in your minor department.

6. Turn in the originals of the Application for Graduation, questionnaire, and Academic Course Record forms for the major (and minor, if applicable) at the Enrollment Service counter.

Filing deadlines for graduation are generally:

| | |
|----------|----------------------------------|
| May | Previous August 1 – September 15 |
| August | Previous November 1- January 15 |
| December | Previous April 1 – May 15 |

For exact deadlines, please contact the office of enrollment services.

TRANSFER OF CREDIT GUIDES

The Transfer Guides for the City Colleges of Chicago and the Triton College provide programmatic information for students transferring from these colleges to the chemistry department at NEIU. These guides suggest specific community college courses that meet pre-requisites for the major or will be accepted into the major at NEIU. They also provide contact information, basic information about the major, admission and degree Requirements, General Education requirements and transfer policies.

1. Transfer of Credit Guides for the City of Chicago Colleges:

| NEIU Chemistry Major: 59-61 credits (43-45 in Chemistry and 16 in cognate areas) | | |
|---|---------|--|
| NEIU Course | Credits | CCC Equivalent (if any) |
| CHEM 211 General Chemistry I | 5 | CHEM 201 General Chemistry I |
| CHEM 212 General Chemistry II | 4 | CHEM 203 General Chemistry II |
| CHEM 213 WIP Quantitative Analysis | 5 | <u>It is recommended that WIP courses be taken at NEIU</u> |
| CHEM 231 Organic Chemistry I | 4 | CHEM 205 Organic Chemistry I |
| CHEM 232 Organic Chemistry II | 4 | CHEM 207 Organic Chemistry II |
| CHEM 311 Physical Chemistry I | 4 | |
| CHEM 312 Physical Chemistry II | 4 | |
| CHEM 330 Instrumental Analysis: Spectroscopy Or CHEM 331 Instrumental Analysis: Quantitative Methods | 4 | |
| CHEM 391 Chemistry Capstone Seminar | 3 | |

| | | |
|--|-----|--|
| Two elective courses <i>Selected from a list of department approved 300-level chemistry courses.</i> | 6-8 | |
| Cognate Courses (16 credits) | | |
| MATH 187 – Calculus I | 4 | MATH 207 – Calculus & Analytic Geometry I |
| MATH 202 – Calculus II | 4 | MATH 208 – Calculus & Analytic Geometry II |
| Two semesters of Physics <i>Algebra-based:</i> PHYS 201 College Physics I and 202 College Physics II with labs PHYS 203 Physics I Laboratory and PHYS 204 Physics II Laboratory Or <i>Calculus-based:</i> PHYS 206 University Physics I and 207 University Physics II with labs PHYS 203 Physics I Laboratory and PHYS 204 Physics II Laboratory | 8 | PHYSICS 221 – Mechanics & Heat and PHYSICS 222 – Electricity, Sound & Light Or PHYSICS 235 Engineering Physics I: Mechanics & Wave Motion and PHYSICS 236 Engineering Physics II: Electricity & Magnetism |
| Chemistry Major Policies | | |
| <ul style="list-style-type: none"> • Students must earn a grade of “C” or higher in all courses counted toward the major. No “P” grades will count toward a major. Chemistry courses with "D" grades may be used as university electives. • Transfer courses must be approved by the department before being applied to the major or minors. • Chemistry courses are designed to be taken in sequence. Students will not be permitted to register for courses if they do not have credit for the prerequisites. | | |

General Education Requirements

Three options are available to students who plan to complete their General Education requirements at CCC.

- **Associate of Arts or Associate of Science:** Students who transfer with an approved Illinois Community College Board (ICCB) Model Associate of Arts or Sciences degree will have met NEIU’s General Education Requirements. For information regarding completing an Associate of Arts or Sciences at CCC, including assistance with course selection, please visit Advising Services at CCC. More information is available at their website (<http://www.ccc.edu/departments/Pages/Advising.aspx>) or by calling (773) 265-5343.

- **Completion of the *Illinois Articulation Initiative (IAI)*:** Students who transfer after completing the Illinois Articulation Initiative (IAI) will have met their General Education requirements. For information regarding the Illinois Articulation Initiative, including courses at CCC that fulfill General Education requirements, please visit the iTransfer web site at www.itransfer.org.
- ***Transfer Course Lists for CCC*:** Students may choose to meet their General Education requirements by selecting courses from NEIU's Transfer Course Equivalency Guides, available at: www.neiu.edu/Transfer. ***When choosing this option, please use the following NEIU General Education guide:***

| NEIU General Education Program | |
|--|--|
| The General Education Program requires a minimum of 39 credit hours of courses distributed among 5 areas. | |
| NEIU Requirement | CCC Equivalent (if any) |
| Math / Quantitative Reasoning – one course (3 hours) | Students who major in Chemistry at NEIU can fulfill this requirement at CCC by taking MATH 207 – Calculus & Analytic Geometry I. |
| Social / Behavioral Sciences 4 courses (12 hours) | <ul style="list-style-type: none"> • No more than two courses from the same department may be used. |
| Natural Sciences 3 courses (9 hours) | <ul style="list-style-type: none"> • Students will fulfill the Natural Sciences requirement by completing the major in Chemistry |
| Fine Arts 2 courses (6 hours) | <ul style="list-style-type: none"> • No more than one course from the same department may be used. |
| Humanities 3 courses (9 hours) | <ul style="list-style-type: none"> • No more than two courses from the same department may be used. • No more than two foreign language courses may be used to fulfill this requirement. |

2. College of Lake County

| NEIU Chemistry Major: 59-61 credits (43-45 in Chemistry and 16 in cognate areas) | | |
|---|---------|--|
| NEIU Course | Credits | CLC Equivalent (If any) |
| CHEM 211 General Chemistry I | 5 | CHM 121 General Chemistry I |
| CHEM 212 General Chemistry II | 4 | CHM 123 General Chemistry II |
| CHEM 213 WIP Quantitative Analysis | 5 | It is recommended that WIP courses be taken at NEIU. |

| | | |
|---|-----|---|
| CHEM 231 Organic Chemistry I | 4 | CHM 222 Organic Chemistry I |
| CHEM 232 Organic Chemistry II | 4 | CHM 223 Organic Chemistry II |
| CHEM 311 Physical Chemistry I | 4 | |
| CHEM 312 Physical Chemistry II | 4 | |
| CHEM 330 Instrumental Analysis: Spectroscopy Or CHEM 331 Instrumental Analysis: Quantitative Analysis | 4 | |
| Two elective courses <i>Selected from a list of department approved 300-level chemistry courses.</i> | 6-8 | |
| CHEM 390 Chemistry Capstone Seminar | 3 | |
| Cognate Courses (16 credits) | | |
| MATH 187 – Calculus I | 4 | MTH 145 – Calculus & Analytic Geometry I |
| MATH 202 – Calculus II | 4 | MTH 146 – Calculus & Analytic Geometry II |
| Two semesters of Physics Algebra-based: PHYS 201 College Physics I and 202 College Physics II with labs PHYS 203 Physics I Laboratory and PHYS 204 Physics II Laboratory Or Calculus-based: PHYS 206 University Physics I and 207 University Physics II with labs PHYS 203 Physics I Laboratory and PHYS 204 Physics II Laboratory | 8 | PHY 121 - General Physics I and PHY 122 – General Physics II PHY 123 – Physics for Science and Engineering I and PHY 124 – Physics for Science and Engineering II |
| Chemistry Major Policies | | |
| <ul style="list-style-type: none"> ☐ Students must earn a grade of “C” or higher in all courses counted toward the major. No “P” grades will count toward a major. Chemistry courses with "D" grades may be used as university electives. ☐ Transfer courses must be approved by the department before being applied to the major or minors. ☐ Chemistry courses are designed to be taken in sequence. Students will not be permitted to register for courses if they do not have credit for the prerequisites | | |

General Education Requirements

Three options are available to students who plan to complete their General Education requirements at CLC.

- Associate of Arts or Associate of Science:** Students who transfer with an approved Illinois Community College Board (ICCB) Model Associate of Arts or Sciences degree will have met NEIU's General Education Requirements. For information regarding completing an Associate of Arts or Sciences at CLC, including assistance with course selection, please visit the Counseling, Admissions, and Transfer Center at CLC. More information is available at their website (www.clcillinois.edu/depts/cou/) or by calling (847) 543-2060.
- Completion of the Illinois Articulation Initiative (IAI):** Students who transfer after completing the Illinois Articulation Initiative (IAI) will have met their General Education requirements. For information regarding the Illinois Articulation Initiative, including courses at CLC that fulfill General Education requirements, please visit the iTransfer web site at www.itransfer.org.
- Transfer Course Lists for CLC:** Students may choose to meet their General Education requirements by selecting courses from NEIU's Transfer Course Equivalency Guides, available at: www.neiu.edu/Transfer. **When choosing this option, please use the following NEIU General Education guide:**

| NEIU General Education Program | |
|--|--|
| The General Education Program requires a minimum of 39 credit hours of courses distributed among 5 areas. | |
| NEIU Requirement | CLC Equivalent (if any) |
| Math / Quantitative Reasoning – one course (3 hours) | Students who major in Chemistry at NEIU fulfill this requirement by taking MTH 145 – Calculus & Analytic Geometry I. |
| Social / Behavioral Sciences 4 courses (12 hours) | <ul style="list-style-type: none"> No more than two courses from the same department may be used. |
| Natural Sciences 3 courses (9 hours) | <ul style="list-style-type: none"> Students will fulfill the Natural Sciences requirement by completing the major in Chemistry |
| Fine Arts 2 courses (6 hours) | <ul style="list-style-type: none"> No more than one course from the same department may be used. |
| Humanities 3 courses (9 hours) | <ul style="list-style-type: none"> No more than two courses from the same department may be used. No more than two foreign language courses may be used to fulfill this requirement. |

3. Transfer of Credit Guides for Triton College:

| NEIU Chemistry Major: 59-61 credits (43-45 in Chemistry and 16 in cognate areas) | | |
|---|----------------|---|
| NEIU Course | Credits | Triton Equivalent (if any) |
| CHEM 211 General Chemistry I | 5 | CHM 140 General Chemistry I |
| CHEM 212 General Chemistry II | 4 | CHM 141 General Chemistry II |
| CHEM 213 WIP Quantitative Analysis | 5 | It is recommended that WIP courses be taken at NEIU |
| CHEM 231 Organic Chemistry I | 4 | CHM 234 Organic Chemistry I |
| CHEM 232 Organic Chemistry II | 4 | CHM 235 Organic Chemistry II |
| CHEM 311 Physical Chemistry I | 4 | |
| CHEM 312 Physical Chemistry II | 4 | |
| CHEM 330 Instrumental Analysis: Spectroscopy Or CHEM 331 Instrumental Analysis: Quantitative Methods | 4 | |
| CHEM 391 Chemistry Capstone Seminar | 3 | |
| Two elective courses <i>Selected from a list of department approved 300-level chemistry courses.</i> | 6-8 | |
| Cognate Courses (16 credits) | | |
| MATH 187 – Calculus I | 4 | MAT 131 – Calculus & Analytic Geometry I |
| MATH 202 – Calculus II | 4 | MAT 133 – Calculus & Analytic Geometry II |
| Two semesters of Physics <i>Algebra-based:</i> PHYS 201 College Physics I and 202 College Physics II with labs PHYS 203 Physics I Laboratory and PHYS 204 Physics II Laboratory Or <i>Calculus-based:</i> PHYS 206 University Physics I and 207 University Physics II with labs PHYS 203 Physics I Laboratory and PHYS 204 Physics II Laboratory | 8 | PHY 101 – General Physics (Mechanics & Heat) and PHY 102 – General Physics (Electricity, Magnetism, Optics & Modern Physics) Or PHY 106 – General Physics (Mechanics) and PHY 107 – General Physics (Electricity, Magnetism and Thermodynamics) |
| Chemistry Major Policies | | |

- Students must earn a grade of “C” or higher in all courses counted toward the major. No “P” grades will count toward a major. Chemistry courses with "D" grades may be used towards the 120 credit hours needed for graduation.
- Transfer courses must be approved by the department before being applied to the major or minors.
- Chemistry courses are designed to be taken in sequence. Students will not be permitted to register for courses if they do not have credit for the prerequisites.

General Education Requirements

Three options are available to students who plan to complete their General Education requirements at Triton.

- **Associate of Arts or Associate of Sciences:** Students who transfer with an approved Illinois Community College Board (ICCB) Model Associate of Arts or Sciences degree will have met NEIU’s General Education Requirements. For information regarding completing an Associate of Arts or Sciences at Triton, including assistance with course selection, please visit the Counseling Department at Triton. More information is available at their website (<http://www.triton.edu/Content.aspx?id=601>) or by calling (708) 456-0300, Ext. 3588.
- **Completion of the Illinois Articulation Initiative (IAI):** Students who transfer after completing the Illinois Articulation Initiative (IAI) will have met their General Education requirements. For information regarding the Illinois Articulation Initiative, including courses at Triton that fulfill General Education requirements, please visit the iTransfer web site at www.itransfer.org.
- **Transfer Course Lists for Triton:** Students may choose to meet their General Education requirements by selecting courses from NEIU’s Transfer Course Equivalency Guides, available at: www.neiu.edu/Transfer. ***When choosing this option, please use the following NEIU General Education guide:***

| NEIU General Education Program | |
|--|--|
| The General Education Program requires a minimum of 39 credit hours of courses distributed among 5 areas. | |
| NEIU Requirement | Triton Equivalent (if any) |
| Math / Quantitative Reasoning – one course (3 hours) | <ul style="list-style-type: none"> • Students who major in Chemistry at NEIU fulfill this requirement by taking MAT 131 – Calculus & Analytic Geometry I at Triton. |

| | |
|--|--|
| Social / Behavioral Sciences 4 courses (12 hours) | <ul style="list-style-type: none"> No more than two courses from the same department may be used. |
| Natural Sciences 3 courses (9 hours) | <ul style="list-style-type: none"> Students will fulfill the Natural Sciences requirement by completing the major in Chemistry. |
| Fine Arts 2 courses (6 hours) | <ul style="list-style-type: none"> No more than one course from the same department may be used. |
| Humanities 3 courses (9 hours) | <ul style="list-style-type: none"> No more than two courses from the same department may be used. No more than two foreign language courses may be used to fulfill this requirement. |

4. Transfer of Credit Guides for Oakton Community College:

| NEIU Chemistry Major: 59-61 credits (43-45 in Chemistry and 16 in cognate areas) | | |
|---|----------------|---|
| NEIU Course | Credits | Oakton Equivalent (if any) |
| CHEM 211 General Chemistry I | 5 | CHM 121 General College Chemistry I |
| CHEM 212 General Chemistry II | 4 | CHM 122 General College Chemistry II |
| CHEM 213 WIP Quantitative Analysis (This course must be completed at NEIU) | 5 | |
| CHEM 231 Organic Chemistry I | 4 | CHM 221 or CHM 223 Organic Chemistry I |
| CHEM 232 Organic Chemistry II | 4 | CHM 222 or CHM 224 Organic Chemistry II |
| CHEM 311 Physical Chemistry I | 4 | |
| CHEM 312 Physical Chemistry II | 4 | |
| CHEM 330 Instrumental Analysis: Spectroscopy Or CHEM 331 Instrumental Analysis: Quantitative Methods | 4 | |
| CHEM 391 Chemistry Capstone Seminar | 3 | |
| Two elective courses <i>Selected from a list of department approved 300-level chemistry courses.</i> | 6-8 | |
| Cognate Courses (16 credits) | | |
| MATH 187 – Calculus I | 4 | MAT 250 – Calculus I |

| | | |
|--|---|--|
| MATH 202 – Calculus II | 4 | MAT 251 – Calculus II |
| <p>Two semesters of Physics</p> <p><i>Algebra-based:</i> PHYS 201 College Physics I and 202 College Physics II with labs PHYS 203 Physics I Laboratory and PHYS 204 Physics II Laboratory</p> <p><u>Or</u></p> <p><i>Calculus-based:</i> PHYS 206 University Physics I and 207 University Physics II with labs PHYS 203 Physics I Laboratory and PHYS 204 Physics II Laboratory</p> | 8 | <p>PHY 131 College Physics I and PHY 132 College Physics II</p> <p><u>Or</u></p> <p>PHY 221 General Physics I and PHY 222 General Physics II</p> |
| <p>Chemistry Major Policies</p> <ul style="list-style-type: none"> • Students must earn a grade of “C” or higher in all courses counted toward the major. No “P” grades will count toward a major. Chemistry courses with "D" grades may be used towards the 120 credit hours needed for graduation. • Transfer courses must be approved by the department before being applied to the major or minors. • Chemistry courses are designed to be taken in sequence. Students will not be permitted to register for courses if they do not have credit for the prerequisites. | | |

General Education Requirements

Three options are available to students who plan to complete their General Education requirements at Oakton Community College.

- **Associate of Arts or Associate of Science:** Students who transfer with an approved Illinois Community College Board (ICCB) Model Associate of Arts or Sciences degree will have met NEIU’s General Education Requirements. For information regarding completing an Associate of Arts or Sciences at Oakton Community College, including assistance with course selection, please visit Advising Services at Oakton Community College. More information is available at their website (<http://www.oakton.edu/student-services/advising-counseling/contact-us.php>) or by calling (847) 635-1741 (Des Plaines campus) or (847) 635-1400 (Skokie campus).
- **Completion of the Illinois Articulation Initiative (IAI):** Students who transfer after completing the Illinois Articulation Initiative (IAI) will have met their General Education requirements. For information regarding the Illinois Articulation Initiative, including courses at Oakton Community College that fulfill General Education requirements, please visit the iTransfer web site at www.itransfer.org.

- **Transfer Course Lists for Oakton Community College:** Students may choose to meet their General Education requirements by selecting courses from NEIU’s Transfer Course Equivalency Guides, available at: www.neiu.edu/Transfer. **When choosing this option, please use the following NEIU General Education guide:**

| NEIU General Education Program | |
|--|--|
| The General Education Program requires a minimum of 39 credit hours of courses distributed among 5 areas. | |
| NEIU Requirement | Oakton Equivalent (if any) |
| Math / Quantitative Reasoning – one course (3 hours) | Students who major in Chemistry at NEIU can fulfill this requirement at Oakton by taking MAT 250 – Calculus I. |
| Social / Behavioral Sciences 4 courses (12 hours) | <ul style="list-style-type: none"> • No more than two courses from the same department may be used. |
| Natural Sciences 3 courses (9 hours) | <ul style="list-style-type: none"> • Students will fulfill the Natural Sciences requirement by completing the major in Chemistry |
| Fine Arts 2 courses (6 hours) | <ul style="list-style-type: none"> • No more than one course from the same department may be used. |
| Humanities 3 courses (9 hours) | <ul style="list-style-type: none"> • No more than two courses from the same department may be used. • No more than two foreign language courses may be used to fulfill this requirement. |

FOUR YEARS UNDERGRADUATE COURSES ROTATION PLAN FOR ACADEMIC YEARS 2012 – 2015

Chemistry majors should adopt this rotation plan when preparing their course schedule. Note that Chemistry and Society, General Chemistry I & II and Organic Chemistry I & II are offered day time and evening in fall, spring and summer terms. Quantitative Analysis is offered daytime or evening in each semester. Courses offered off campus at El Centro and at Carruthers Center for Inner City Studies are specified.

Please note: “D” refers to courses offered between 8:00 a.m. and 4:00 p.m. Monday through Friday. “E” refers to courses offered between 4:15 p.m. and 10:00 p.m. Monday through Friday. F, S and SU refer to fall, spring and summer semesters, respectively.

This rotation plan will be fully adopted for the required major courses. However, it could be slightly modified in terms of elective ones. For example, when new courses are introduced or scheduled ones are cancelled due to low enrollment.

COURSES OFFERED IN FALL, SPRING AND SUMMER SEMESTERS

| | |
|----------|---|
| CHEM-103 | Chemistry & Society [F & S (D&E), SU (D)] |
| CHEM-103 | Chemistry & Society [F & S (D), SU (E)] at El Centro |
| CHEM-211 | General chemistry I [F & S (D&E), SU (D)] |
| CHEM-212 | General chemistry II [F & S (D&E), SU (D)] |
| CHEM-213 | Quantitative analysis (WIP) [F (D), S (E), SU (E)] |
| CHEM-231 | Organic chemistry I [F & S (D&E), SU (D)] |
| CHEM-232 | Organic chemistry II [F & S (D&E), SU (D)] |
| CHEM-260 | General chemistry I seminar [F, S & SU (D)] |
| CHEM-261 | General chemistry II seminar [F, S & SU (D)] |
| CHEM-262 | Organic chemistry I seminar [F, S & SU (D)] |
| CHEM-263 | Organic chemistry II seminar [F, S & SU (D)] |
| CHEM-305 | Independent study in chemistry |
| CHEM-365 | Internship in chemistry I |
| CHEM-366 | Internship in chemistry II |
| CHEM-390 | Seminar in Chemistry |
| CHEM-399 | Undergraduate research |

COURSES OFFERED IN FALL AND SPRING SEMESTERS

| | |
|----------|--------------------------------|
| CHEM-110 | Chemical Concepts (D) |
| CHEM-391 | Chemistry capstone seminar (E) |

COURSES OFFERED ONLY IN FALL SEMESTER

| | |
|----------|---|
| CHEM-103 | Chemistry and Society (D) at Center for Inner City Studies |
| CHEM-311 | Physical chemistry I (E) |
| CHEM-320 | Chemical aspects of environmental chemistry (E) |
| CHEM-331 | Instrumental analysis: Quantitative methods (E) |
| CHEM-347 | Advanced organic chemistry: polyfunctional compounds (E) |
| CHEM-360 | Physical chemistry I seminar (E) |

COURSES OFFERED ONLY IN SPRING SEMESTER

| | |
|----------|--|
| CHEM 312 | Physical chemistry II (E) |
| CHEM-319 | Industrial aspects of environmental chemistry (E) |
| CHEM-330 | Instrumental analysis: Spectroscopy (E) |
| CHEM-361 | Physical chemistry II seminar (E) |
| CHEM-348 | Advanced organic chemistry: Bioorganic compounds (E) |

COURSES OFFERED ONLY IN SUMMER SEMESTER

CHEM-316 Inorganic chemistry (E)

CHEM 306L ST: Experiments & Field Work in Environmental Chemistry (D)

COURSES IN ROTATION:

Academic Year 2012-2013

Courses expected to be offer in Fall 2012

CHEM-353 Principles of Pharmacology (E)

Courses expected to be offered in Spring 2013

CHEM-349 Organic synthesis (E)

Academic Year 2013-2014

Courses expected to be offered in Fall 2013

CHEM 350 Principles of Toxicology (E)

Courses expected to be offered in Spring 2014

CHEM 211 General Chemistry I (D) **at El Centro**

CHEM 306 ST: Principles of Medicinal Chemistry (E)

CHEM 357 Chemical Kinetics (E)

Academic Year 2014-2015

Courses expected to be offered in Fall 2014

CHEM 211 General Chemistry I (D) **at El Centro**

CHEM 212 General Chemistry II (D) **at El Centro**

CHEM-353 Principles of Pharmacology (E)

Courses expected to be offered in Spring 2015

CHEM 211 General Chemistry I (D) **at El Centro**

CHEM 212 General Chemistry II (D) **at El Centro**

CHEM-349 Organic synthesis (E)

Academic Year 2015-2016

Courses expected to be offered in Fall 2015

CHEM 211 General Chemistry I (D,E) **at El Centro**

CHEM 212 General Chemistry II (D,E) **at El Centro**

CHEM 350 Principles of Toxicology (E)

Courses expected to be offered in Spring 2016

CHEM 211 General Chemistry I (D,E) **at El Centro**

CHEM 212 General Chemistry II (D,E) **at El Centro**

CHEM 306 Principles of Medicinal Chemistry (E)

CHEM 357 Chemical Kinetics (E)

COURSE OFFERINGS

CHEM-103 Chemistry and society, 3 cr. Introduction of chemistry based on the study of some of the processes and materials which chemistry contributes to our civilization. Elementary chemical principles are used to explain the behavior of synthetic polymers, toxic substances, food additives, cleaning products, and other chemically manufactured materials. Knowledge of basic algebra skills is assumed. Lecture 3 hours. **Prereq.:** MATH-091 or intermediate Algebra Placement.

CHEM-110 Chemical Concepts, 3 cr. Lab-oriented survey course in chemistry designed for the non-science major including such topics as the historical development of chemistry, atomic theory, solution chemistry, organic, and biochemistry. Knowledge of basic algebra skills is assumed. Lecture 2 hours, lab 2 hours. **Prereq.:** MATH-092.

CHEM-200 Introduction to General Chemistry, 3 cr. Basic principles of chemistry with particular emphasis on solving simple numerical problems and writing and balancing chemical equations; especially for students planning to take CHEM-211. Lecture 3 hours.

CHEM-211 General Chemistry I, 5 cr. Introduction to general inorganic chemistry, including stoichiometry, concentration units, gas laws, atomic structure, bonding, periodic laws, states of matter, solutions, acid-base theories, rate, equilibrium, and oxidation reduction theory. Lecture and Laboratory. Lecture 4 hours. Lab 3 hours. **Prereq.:** minimum math placement exam recommendation of 3 or 4 or satisfactory completion of MATH-DEV-092.

CHEM-212 General Chemistry II, 4 cr. Continuation of General Chemistry I with emphasis on reaction rates, equilibria in aqueous solutions, thermochemistry, oxidation-reduction reaction, and the methods of quantitative analysis. Lecture and laboratory. Lecture 3 hours. Lab 3 hours. **Prereq.:** CHEM-211 and pre- or co- requisite MATH-185.

CHEM-213 WIP: Quantitative Analysis, 5 cr. Statistical analysis of data, chemical equilibrium, simultaneous equilibria, classical and non-classical gravimetric and volumetric techniques, acid-base and oxidation reduction reactions, spectrophotometric and potentiometric methods. Lecture 3 hours. Lab 6 hours. **Prereq.:** CHEM-212 and ENG 101 with grade of "C" or better.

CHEM-231 Organic Chemistry I, 4 cr. Study of the structure, properties, reaction mechanisms, and nomenclature of aliphatic and aromatic hydrocarbons and their derivatives. Lecture and laboratory. Lecture 3 hours. Lab 3 hours. **Prereq.:** CHEM-212.

CHEM-232 Organic Chemistry II, 4 cr. Continuation of CHEM-231. A study of the structure, properties, reaction mechanisms, synthesis, and infrared and nuclear magnetic resonance spectroscopy of the alcohols, acids, amines, and other mono-functional compounds. Lecture and laboratory. Lecture 3 hours. Lab 3 hours. **Prereq.:** CHEM-231.

CHEM-260 General Chemistry I Seminar, 1 cr. Enrichment seminar accompanying CHEM-211. Students do problem solving in collaborative learning groups on material derived from and supplementing General Chemistry I to gain a deeper understanding of concepts and applications. Lecture 2 hours. **Prereq.:** Restricted to students taking CHEM-211 concurrently.

CHEM-261 General Chemistry II Seminar, 1 cr. Enrichment seminar accompanying CHEM-212. Students do problem solving in collaborative groups on material derived from and supplementing General Chemistry II to gain a deeper understanding of concepts and applications. Lecture 2 hours. **Prereq.:** Restricted to students taking CHEM-212 concurrently.

CHEM-262 Organic Chemistry I Seminar, 1 cr. Enrichment seminar accompanying CHEM-231. Students do problem solving in collaborative learning groups on material derived from and supplementing Organic Chemistry I to gain a deeper understanding of concepts and applications. Lecture 2 hours. **Prereq.:** Restricted to students taking Organic Chemistry I.

CHEM-263 Organic Chemistry II Seminar, 1 cr. Enrichment seminar accompanying CHEM-232. Students do problem solving in collaborative learning groups on material derived from and supplementing Organic Chemistry II to gain a deeper understanding of concepts and applications. **Prereq.:** Restricted to students taking Organic Chemistry II.

CHEM-305 Independent Study in Chemistry, 3 cr. An introduction to original chemical research under faculty supervision. Independent Studies require the approval of the instructor, department chair and the College Dean. **Prereq.:** CHEM-213 and CHEM-232 and consent of chairperson.

CHEM-306 Selected Topics in Chemistry, 3 cr. Topics for current interest for students who have junior standing in chemistry. Consult the Schedule of Classes for specific topics. Lecture 3 hours. **Prereq.:** CHEM-232; junior standing.

CHEM-311 Physical Chemistry I, 4 cr. Theoretical and experimental study of the structure and properties of matter, including the gaseous state, chemical thermodynamics, chemical equilibrium, liquids and phase equilibria, solutions of nonelectrolytes and ionic solutions. Lecture and laboratory. Lecture 3 hours. Lab 3 hours. **Prereq.:** CHEM-213, CHEM-232, MATH-187, PHYS-203, and PHYS-201 or PHYS-206. (It is strongly suggested that the student have completed a year of physics with laboratory.)

CHEM-312 Physical Chemistry II, 4 cr. Continuation of CHEM-311, including the kinetic-molecular theory, transport properties, chemical kinetics, statistical mechanics, quantum theory, atoms and diatomic molecules, and spectroscopy. Lecture and laboratory. Lecture 3 hours. Lab 3 hours. **Prereq.:** CHEM-311, MATH-202, PHYS-204, and PHYS-202 or PHYS-207.

CHEM-316 Inorganic Chemistry, 4 cr. A thorough study of bonding in non-transition and transition elements, periodic trends and tendencies, structural relationships, and mechanisms of inorganic reactions. Lecture and laboratory. Lecture 3 hours. Lab 3 hours. **Prereq.:** CHEM-232.

CHEM-318 Industrial Chemistry, 3 cr. A study of the industrial aspects of chemistry, including economics, design and operation of process equipment, and a study of a variety of chemical industries. Lecture 3 hours. **Prereq.:** CHEM-231.

CHEM-319 Chemical Aspects of Environmental Chemistry, 3 cr. a survey of the chemical principles involved in environmental problems. Topics include atmospheric, aquatic, and geospheric chemistry, sources of pollutants and the consequences of pollution. Lecture 3 hours. **Prereq.:** CHEM-212 and CHEM-232.

CHEM-320 Industrial Aspects of Environmental Chemistry, 3 cr. Industrial aspects of environmental chemistry covering specific topics such as energy, water and wastewater treatment, treatment and disposal of domestic and industrial wastes, techniques for detecting and analyzing chemical pollutants, environmental modeling and recycling strategies. Lecture 3 hours. **Prereq.:** CHEM-213 and CHEM-232.

CHEM-326 Chemical Literature, 2 cr. Introduction to library research in chemistry, and preparation of a review paper in some current field of chemistry. Lecture 2 hours. **Prereq.:** one 300-level course in chemistry.

CHEM-330 Instrumental Analysis: Spectroscopy, 4 cr. Intensive laboratory introduction to infrared spectroscopy, ultraviolet and visible spectroscopy, mass spectrometry, and nuclear magnetic resonance spectroscopy, and the quantitative, quantitative, and research aspects associated with them. Lecture and laboratory. Lecture 3 hours. Lab 6 hours. **Prereq.:** CHEM-213, CHEM-232 and consent of instructor.

CHEM-331 Instrumental Analysis: Quantitative Methods, 4 cr. Introduction to the theory and practice of instrumental methods used to determine composition of materials, including gas and liquid chromatography, atomic absorption and emission, X-ray diffraction and fluorescence, and potentiometry. Lecture and Laboratory. Lecture 3 hours. Lab 6 hours. **Prereq.:** CHEM-213 and CHEM-231.

CHEM-332 Identification of Organic Compounds, 4 cr. Chemical, physical, and spectroscopic methods and their

use in the separation, purification, and identification of organic compounds. Lecture and laboratory. Lecture 2 hours. Lab 6 hours. **Prereq.:** CHEM-213 and CHEM-232.

CHEM-347 Advanced Organic Chemistry: Polyfunctional Compounds, 3 cr. Chemistry of polyfunctional compounds, condensed aromatic and heterocyclic systems, electrocyclic reaction and molecular rearrangements. Lecture 3 hours. **Prereq.:** CHEM-232.

CHEM-348 Advanced Organic Chemistry: Bioorganic Compounds, 3 cr. The chemistry of complex molecules such as proteins, nucleic acids, and carbohydrates is studied from the point of view of their physical properties, and their reaction, synthesis, and structure-function relationships. Lecture 3 hours. **Prereq.:** CHEM-232.

CHEM-394 Organic Synthesis, 3 cr. A systematic approach to the synthesis of complex organic compounds will be developed. The retrosynthetic approach will be taken, with a final target molecule being the goal of the synthesis. It will be taken apart, step-by-step to arrive at reasonable starting materials for the synthesis. Availability and expense of potential starting materials, necessity of protecting groups, and production of isomeric and/or stereoisomeric mixture will be among the points of consideration for each synthesis. Lecture 3 hours. **Prereq.:** CHEM-347.

CHEM-350 Principles of Toxicology, 3 cr. This course offers an introduction to the basic principles of the broad field of toxicology. The mechanisms involved in what constitutes a toxic response will be explored, including examples of toxic chemicals targeting specific biochemical pathways in the human body. Major groups of toxic chemicals, such as pesticides, metals, solvents, vapors, radiation and radioactive materials, and animal venoms and poisons, will be surveyed. Also addressed are the applied areas of food, forensic/analytical, and occupational toxicology. **Prereq.:** CHEM-231 with a minimum C grade.

CHEM-353 Principles Pharmacology, 3 cr. This course will focus on the action of drugs on major organ systems, including the nervous, cardiovascular, gastrointestinal, respiratory, and reproductive systems, as well as drugs for cancer, infectious, and inflammatory diseases. It also covers pharmacokinetics, drug-receptor interactions, and drug metabolism for these categories of therapeutic agents. **Prereq.:** CHEM-231 with a minimum grade of C.

CHEM-357 Chemical Kinetics, 3 cr. The study and evaluation of various theories of reaction rates and mechanisms of chemical reactions. Lecture 3 hours. **Prereq.:** CHEM-311.

CHEM-360 Physical Chemistry I Seminar, 1 cr. Enrichment Seminar accompanying CHEM 311. Students do problem solving in collaborative groups on material derived from and supplementing Physical Chemistry I to gain a deeper understanding of concepts and applications. *Prereq: restricted to students taking CHEM-311 concurrently.*

CHEM-361 Physical Chemistry II Seminar, 1 cr. Enrichment Seminar accompanying CHEM 312. Students do problem solving in collaborative groups on material derived from and supplementing Physical Chemistry II to gain a deeper understanding of concepts and applications. *Prereq: restricted to students taking CHEM-312 concurrently.*

CHEM-365 Internship in Chemistry I, 6 cr. Experience in chemistry in an off-campus location, e.g. business or government. The student registering selects well-defined academic goals to be achieved. These goals will be selected in cooperation with an on-campus advisor. **Prereq.:** *Independent Studies require the approval of the instructor, department chair and the College Dean.*

CHEM-366 Internship in Chemistry II, 6 cr. Continuation of CHEM-365. **Prereq.:** *Independent Studies require the approval of the instructor, department chair and the College Dean.*

CHEM-390 Seminar in Chemistry, 1 cr. Critical review of research presented by visiting university and industrial chemists, and student preparation and presentation of original and library chemical research topics. *Prereq. or linked course: CHEM-311.*

CHEM-391 Chemistry Capstone Seminar, 3 cr. Critical review of research presented by visiting university and industrial chemists, and student preparation and presentation of original and library research topics. The course

will also explore issues related to becoming a morally responsible scientist and will include ethical problem solving. Lecture 4 hours. **Prereq.:** pre- or co- requisite CHEM-311.

CHEM-399 Undergraduate Research, 3 cr. Original laboratory research conducted with a faculty member. The course will usually require some library research, 10-12 hours per week laboratory work, and the preparation of a formal, typed report. The course is useful for those students seeking recognition under the guidelines authorized by the American Chemical Society. **Prereq.:** pre- or co- requisite CHEM-311, and either CHEM-330 or CHEM-331.

CHEMISTRY DEPARTMENT FACULTY

The Department of Chemistry is distinguished by a talented and dedicated faculty. Each member of the faculty has broad areas of expertise and special skills, which bring strength and diversity to departmental activities. The commitment to excellence in teaching and willingness to work together to achieve common goals are hallmarks of the Department.

| <i>Last Name</i> | <i>First Name</i> | <i>Title</i> | <i>Number</i> | <i>Email</i> | <i>Office</i> |
|------------------|-------------------|--|---------------|--|---------------|
| Al-Bazi | John | Chair | 442-5681 | s-albazi@neiu.edu | BBH 214G |
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ADJUNCT FACULTY

| <i>Last Name</i> | <i>First Name</i> | <i>Title</i> | <i>Number</i> | <i>Email</i> | <i>Office</i> |
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| | | | | | |
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| Wysocki | Jerome | Instructor | 442-5899 | j-wysocki@neiu.edu | BBH 212G |