

**Canisius College**  
**Department of Chemistry & Biochemistry**  
**Student Handbook**  
**2009–2011**



\*\*A copy of this handbook can be downloaded from the Chemistry & Biochemistry Department web page at <http://www.canisius.edu/chemistry>

## **Table of Contents**

Welcome	4
Declaring a Major or Minor	5
Side-by-side Comparison of Chemistry & Biochemistry Majors	6
Chemistry ACS Track Suggested Schedule & Requirements	7
Chemistry Track Suggested Schedule & Requirements	8
Chemistry Health Professions Track Suggested Schedule & Requirements	9
Chemistry ACS Track + Business Minor Suggested Schedule & Requirements	10
Chemistry Track + Business Minor Suggested Schedule & Requirements	11
Chemistry Health Professions Track + Business Minor Suggested Schedule & Requirements	12
Biochemistry ACS Track Suggested Schedule & Requirements	13
Biochemistry Track Suggested Schedule & Requirements	14
Biochemistry ACS Track + Business Minor Suggested Schedule & Requirements	15
Biochemistry Track + Business Minor Suggested Schedule & Requirements	16
Chemistry Minor Requirements	17
Suggested Minors and Electives	18
Other Important Courses	19
Extracurricular Activities in the Sciences	20
Information for Students Interested in Graduate School	21-22
Information for Students Interested in Medical & Dental School	23-25
Information for Students Interested in Pharmacy School	26-27
Meet the Faculty & Staff	28-31
Course Descriptions	32-35
Chemistry ACS Track Graduation Checklist	36
Chemistry Track Graduation Checklist	37

Chemistry Health Professions Track Graduation Checklist	38
Chemistry ACS Track + Business Minor Graduation Checklist	39-40
Chemistry Track + Business Minor Graduation Checklist	41-42
Chemistry Health Professions Track + Business Minor Graduation Checklist	43-44
Biochemistry ACS Track Graduation Checklist	45
Biochemistry Track Graduation Checklist	46
Biochemistry ACS Track + Business Minor Graduation Checklist	47-48
Biochemistry Track + Business Minor Graduation Checklist	49-50

## Welcome to the Department of Chemistry & Biochemistry at Canisius College!

Inside these pages you will find information about:

- How to declare a major or minor
- Chemistry & Biochemistry Tracks including course requirements and recommended schedules
- Careers suitable for Chemistry & Biochemistry majors
- Extracurricular activities in the sciences
- Faculty and their research
- Important information for students interested in obtaining advanced degrees in Chemistry and Biochemistry (MS & PhD) after graduation
- Important information for students interested in attending medical or dental school after graduation
- Important information for students interested in attending pharmacy school after graduation

We hope that you find this information helpful and that you enjoy your studies here at Canisius. If you have any questions, please seek out a faculty member. We're excited that you are a member of our department and can't wait to watch you succeed!

### The Chemistry & Biochemistry Department Faculty & Staff

Mariusz Kozik, Chair (Inorganic)	Jessica Disney (Biochemistry)
Frank Dinan (Organic)	Tim Gregg (Organic)
Roberto Gregorius (Science Education)	Krit Marohn (General Chemistry Labs)
Jim Maul (Organic Labs)	Mary O'Sullivan (Organic)
Pete Schaber (Analytical)	Phil Sheridan (Physical)
Steve Szczepankiewicz (Analytical)	Tom Stabler (Lab Director)
Alice Steltermann (Administrative Assistant)	

## **Declaring a Major or Minor in Chemistry or Biochemistry**

All freshmen are asked to declare a major when they matriculate at Canisius College. If you declared Chemistry or Biochemistry as a major, then additional paperwork is NOT required.

If you would like to change your major to Chemistry or Biochemistry from another major, then follow the steps in section A. If you would like to declare a double or triple major, follow the steps in section B. To declare one or more minors, follow the steps in Section C. All forms can be downloaded from the Student Advisement Center website: [http://www.canisius.edu/student\\_advise/forms.asp](http://www.canisius.edu/student_advise/forms.asp)

### **A. In order to change a single major:**

Complete a Change of Major Form and submit it to the Office of Student Records and Registration, located in Bagen Hall Room 106. Forms are available in the Office of Student Records or the Student Advisement Center.

### **B. In order to declare (or change) a dual/triple major:**

Students in the College of Arts & Sciences and the Wehle School of Business should pick up the Majors and Minors Form in the Student Advisement Center in Bagen Hall Room 103. Students in the School of Education and Human Services should pick-up the form in Bagen Hall Room 206. To complete the form, obtain:

- The signature of the department chairperson for each major being declared.
- Return the completed form with the department chairpersons' signatures to either the Office of Student Advisement or Associate Dean for Undergraduate Education for an Associate Dean's signature.
- The completed form will be sent to the Office of Student Records and Registration by the Associate Dean. All majors will be changed once the signed form is received by the Office of Student Records and Registration.

### **C. In order to declare (or change) a minor:**

Use the dual major form described above. (If you wish to remove a minor, then you will need to indicate this on the form and check with the Office of Student Records.)

## Side-by-side Comparison of Chemistry & Biochemistry Tracks

CHM ACS	CHM	CHM HT	BCH ACS	BCH
<b>Cognate Courses</b>				
BIO 101 + L	BIO 101 + L	BIO 101 + L	BIO 101 + L	BIO 101 + L
		BIO 102 + L	BIO 102 + L	BIO 102 + L
Calc I	Calc I	Calc I	Calc I	Calc I
<b>Calc II</b>	Calc II or Stats	Calc II or Stats	<b>Calc II</b>	Calc II or Stats
<b>PHY 223 + L</b>	PHY 201 + L	PHY 201 + L	<b>PHY 223 + L</b>	PHY 201 + L
<b>PHY 224 + L</b>	PHY 202 + L	PHY 202 + L	<b>PHY 224 + L</b>	PHY 202 + L
<b>Introductory Chemistry</b>				
General CHM I + L	General CHM I + L	General CHM I + L	General CHM I + L	General CHM I + L
General CHM II + L	General CHM II + L	General CHM II + L	General CHM II + L	General CHM II + L
<b>Fundamental Courses</b>				
Organic I + L	Organic I + L	Organic I + L	Organic I + L	Organic I + L
Organic II + L	Organic II + L	Organic II + L	Organic II + L	Organic II + L
Analytical + L	Analytical + L	Analytical + L	Analytical + L	
Inorganic	Inorganic	Inorganic	Inorganic	Inorganic
Classical Physical + L	Classical Physical + L	Classical Physical (no L)	Classical Physical I + L (I or II)	Classical Physical (no L)
BCH I + L (or CEL)	BCH I (no L)	BCH I (no L)	BCH I + L	BCH I + L
<b>In-depth Courses</b>				
Modern Physical + L			Physical II + L (I or II)	
		BCH II (no L)	BCH II + L	BCH II + L
Spec + L	Spec + L		(Spec or Instr) + L	(Spec or Instr) + L
Instr + L	Instr + L			
CE + L (or BCH I L)	CE + L	CE + L	MOLBIO + L	MOLBIO + L
CE	CE	SE + L	BCE	CE or BCE
CE	CE	SE		BCE
CHM 381,480,481	CHM 381,480,481	CHM 381,480,481	CHM 381,480,481	CHM 381,480,481

CE = Chemistry Elective

CE + L = Chemistry Elective + Lab

BCE = Biochemistry Elective

MOL BIO + L = Molecular Biology Elective + Lab

SE = Science Elective; a 300 or 400 level course in CHM, BCH, BIO, PHY, or CSC

SE + L = Science Elective + Lab

## Chemistry ACS Certified: Suggested Schedule and Requirements

Freshman Year	
Fall	Spring
CHM 111 + L	CHM 112 + L
BIO 101 + L	
MAT 111	MAT 112
	PHY 223 + L

Sophomore Year	
Fall	Spring
CHM 227 + L	CHM 228 + L
CHM 244	CHM 230 + L
PHY 224 + L	

Junior Year	
Fall	Spring
CHM 301 + L	CHM 302 + L
CHM 334 + L	CHM 430 + L or CE ( $\pm$ L)
	CHM 381

Senior Year	
Fall	Spring
CE	CHM 430 + L or CE ( $\pm$ L)
BCH 301 ( $\pm$ L)	CE
CHM 480	CHM 481

Chemistry ACS Certified Track requires two chemistry electives (CE), one of them with the corresponding laboratory. BCH 301 laboratory can count as a chemistry elective laboratory (hence the " $\pm$  L"). BCH 301 course is required and does not count as a chemistry elective.

"+ L" indicates that the corresponding laboratory is required.

## Chemistry: Suggested Schedule and Requirements

Freshman Year	
Fall	Spring
CHM 111 + L	CHM 112 + L
BIO 101 + L	
MAT 111	MAT 112/141

Sophomore Year	
Fall	Spring
CHM 227 + L	CHM 228 + L
CHM 244	
PHY 201 + L	PHY 202 + L

Junior Year	
Fall	Spring
CHM 301 + L	CE
CHM 334 + L	CHM 230 + L
	CHM 381

Senior Year	
Fall	Spring
CE ( $\pm$ L)	CE ( $\pm$ L)
BCH 301 ( $\pm$ L)	CHM 430 + L
CHM 480	CHM 481

Chemistry Track requires three chemistry electives (CE), two of them with the corresponding laboratory. BCH 301 laboratory can count as a chemistry elective laboratory (hence the " $\pm$  L"). BCH 301 course is required and does not count as a chemistry elective.

"+ L" indicates that the corresponding laboratory is required.

## Chemistry Health Professions: Suggested Schedule and Requirements

<b>Freshman Year</b>	
Fall	Spring
CHM 111 + L	CHM 112 + L
BIO 101 + L	BIO 102 + L
MAT 111	MAT 112/141

<b>Sophomore Year</b>	
Fall	Spring
CHM 227 + L	CHM 228 + L
CHM 244	
PHY 201 + L	PHY 202 + L

<b>Junior Year</b>	
Fall	Spring
CHM 301	CHM 230 + L
BCH 301	BCH 302
	CHM 381

<b>Senior Year</b>	
Fall	Spring
CE + L	SE + L
SE	
CHM 480	CHM 481

Chemistry Health Professions Track requires two science electives (SE), one (1) with the corresponding laboratory and one chemistry elective (CE) with lab. BCH 301 laboratory can count as a science elective laboratory. BCH 301 course is required and does not count as a chemistry elective.

“+ L” indicates that the corresponding laboratory is required.

**Chemistry ACS Certified with Business Minor:**  
**Suggested Schedule and Requirements**

<b>Freshman Year</b>	
Fall	Spring
CHM 111 + L	CHM 112 + L
BIO 101 + L	PHY 223 + L
MAT 111	MAT 112

<b>Sophomore Year</b>	
Fall	Spring
CHM 227 + L	CHM 228 + L
CHM 244	CHM 230 + L
PHY 224 + L	MAT 141 or ECO 255
	(ECO 101)

<b>Junior Year</b>	
Fall	Spring
CHM 301 + L	CHM 302 + L
CHM 334 + L	CHM 430 + L
(ECO 101)	CHM 381
MKT 201	MGT 101

<b>Senior Year</b>	
Fall	Spring
BCH 301	CE + L
CHM 480	CE
CE	CHM 481
ACC 201	FIN 201

Chemistry ACS Certified Track with a Business Minor requires three chemistry electives (CE), one with the corresponding laboratory. BCH 301 laboratory can count as a chemistry elective laboratory (hence the “± L”). BCH 301 course is required and does not count as a chemistry elective.

“+ L” indicates that the corresponding laboratory is required.

**Chemistry with Business Minor:**  
**Suggested Schedule and Requirements**

<b>Freshman Year</b>	
Fall	Spring
CHM 111 + L	CHM 112 + L
BIO 101 + L	
MAT 111	MAT 141 or ECO 255

<b>Sophomore Year</b>	
Fall	Spring
CHM 227 + L	CHM 228 + L
PHY 201 + L	PHY 202 + L
CHM 244	ECO 102

<b>Junior Year</b>	
Fall	Spring
CHM 301 + L	CHM 230 + L
CHM 334 + L	CE
ECO 101	CHM 381
	MGT 101

<b>Senior Year</b>	
Fall	Spring
BCH 301	CE + L
CE	CHM 430 + L
CHM 480	CHM 481
MKT 201	FIN 201
ACC 201	

Chemistry Track with a Business Minor requires three chemistry electives (CE), one with the corresponding laboratory. BCH 301 laboratory can count as a chemistry elective laboratory. BCH 301 course is required and does not count as a chemistry elective.

**Chemistry Health Professions with Business Minor:**  
**Suggested Schedule and Requirements**

<b>Freshman Year</b>	
<b>Fall</b>	<b>Spring</b>
CHM 111 + L	CHM 112 + L
BIO 101 + L	BIO 102 + L
MAT 111	MAT 141 or ECO 255

<b>Sophomore Year</b>	
<b>Fall</b>	<b>Spring</b>
CHM 227 + L	CHM 228 + L
PHY 201 + L	PHY 202 + L
CHM 244	ECO 102

<b>Junior Year</b>	
<b>Fall</b>	<b>Spring</b>
CHM 301	CHM 230 + L
BCH 301	BCH 302
ECO 101	CHM 381
	MGT 101

<b>Senior Year</b>	
<b>Fall</b>	<b>Spring</b>
CE + L	SE + L
CHM 480	SE
MKT 201	CHM 481
ACC 201	FIN 201

Chemistry Health Professions Track with a Business Minor requires two science electives (SE), one with the corresponding laboratory and one chemistry elective (CE) with lab. BCH 301 laboratory can count as a chemistry elective laboratory. BCH 301 course is required and does not count as a science elective.

## **Biochemistry ACS Certified: Suggested Schedule and Requirements**

<b>Freshman Year</b>	
Fall	Spring
CHM 111 + L	CHM 112 + L
BIO 101 + L	BIO 102 + L
MAT 111	MAT 112

<b>Sophomore Year</b>	
Fall	Spring
CHM 227 + L	CHM 228 + L
CHM 244	PHY 223 + L

<b>Junior Year</b>	
Fall	Spring
CHM 301 ( $\pm$ L)	CHM 230 + L
BCH 301 + L	BCH 302 + L
PHY 224 + L	CHM 381

<b>Senior Year</b>	
Fall	Spring
(CHM 334 + L)	(CHM 430 + L)
BCE	CHM 302 ( $\pm$ L)
	MOL BIO + L
CHM 480	CHM 481

Biochemistry ACS Certified Track requires CHM 301L or CHM 302L; and CHM 334 + L or CHM 430 + L.

BCE = biochemistry elective; MOL BIO + L = molecular biology elective + lab

## **Biochemistry: Suggested Schedule and Requirements**

<b>Freshman Year</b>	
Fall	Spring
CHM 111 + L	CHM 112 + L
BIO 101 + L	BIO 102 + L
MAT 111	MAT 112/141

<b>Sophomore Year</b>	
Fall	Spring
CHM 227 + L	CHM 228 + L
CHM 244	
PHY 201 + L	PHY 202 + L

<b>Junior Year</b>	
Fall	Spring
CHM 301	MOL BIO + L
BCH 301 + L	BCH 302 + L
	CHM 381

<b>Senior Year</b>	
Fall	Spring
(CHM 334 + L)	(CHM 430 + L)
CE	BCE
CHM 480	CHM 481

Biochemistry Track requires CHM 334 + L or CHM 430 + L.

CE = chemistry elective; BCE = biochemistry elective; MOL BIO + L = molecular biology elective + lab

**Biochemistry ACS Certified with Business Minor:**  
**Suggested Schedule and Requirements**

<b>Freshman Year</b>	
<b>Fall</b>	<b>Spring</b>
CHM 111 + L	CHM 112 + L
BIO 101 + L	BIO 102 + L
MAT 111	MAT 112

<b>Sophomore Year</b>	
<b>Fall</b>	<b>Spring</b>
CHM 227 + L	CHM 228 + L
CHM 244	CHM 230 + L
ECO 101	PHY 223 + L
(ECO 255)	

<b>Junior Year</b>	
<b>Fall</b>	<b>Spring</b>
CHM 301 ( $\pm$ L)	CHM 302 ( $\pm$ L)
BCH 301 + L	BCH 302 + L
PHY 224 + L	CHM 381
	MGT 101

<b>Senior Year</b>	
<b>Fall</b>	<b>Spring</b>
(CHM 334 + L)	(CHM 430 + L)
BCE	MOL BIO + L
CHM 480	CHM 481
ACC 201	FIN 201
MKT 201	(MAT 141)

Biochemistry ACS Certified Track with a Business Minor requires CHM 334 + L or CHM 430 + L; and CHM 301L or CHM 302L.

BCE = biochemistry elective; MOL BIO + L = molecular biology elective + lab

Students are required to take either ECO 255 or MAT 141 to satisfy minor requirements.

**Biochemistry with Business Minor:  
Suggested Schedule and Requirements**

<b>Freshman Year</b>	
Fall	Spring
CHM 111 + L	CHM 112 + L
BIO 101 + L	BIO 102 + L
MAT 111	MAT 141

<b>Sophomore Year</b>	
Fall	Spring
CHM 227 + L	CHM 228 + L
CHM 244	
PHY 201 + L	PHY 202 + L
	ECO 101

<b>Junior Year</b>	
Fall	Spring
CHM 301	MOL BIO + L
BCH 301 + L	BCH 302 + L
	CHM 381
MKT 201	MGT 101

<b>Senior Year</b>	
Fall	Spring
(CHM 334 + L)	(CHM 430 + L)
CE or BCE	BCE
CHM 480	CHM 481
ACC 201	FIN 201

Biochemistry Track with a Business Minor requires CHM 334 + L or CHM 430 + L.

CE = chemistry elective; BCE = biochemistry elective; MOL BIO + L = molecular biology elective + lab

## **CHEMISTRY MINOR**

Students majoring in various disciplines such as biology, mathematics, physics, bioinformatics, computer science, psychology and business can benefit from pursuing a minor in chemistry. The chemistry minor requires a student to complete the following sequence of courses:

- Two semesters of General Chemistry with laboratory:  
CHM 111 + L and CHM 112 + L (8 credits)
- Two semesters of Organic Chemistry with laboratory:  
CHM 227 + L and CHM 228 + L (8 credits)
- One semester of Analytical Chemistry with laboratory\*:  
CHM 230 + L or CHM 334 + L or CHM 430 + L (4 credits)
- One semester of Physical Chemistry\*:  
CHM 301 or CHM 302 or CHM 244 (3 credits)
- Chemistry Elective:  
one CHM 300 or 400 level course (3 credits)

## **SUGGESTED MINORS**

- School of Business
  - Business
  - Marketing
  - Management
- College of Arts & Sciences
  - Modern Language (Spanish, French, etc.)
  - Math
  - Physics
  - Computer Science
  - Information Technology
  - Biology
  - Psychology

## **RECOMMENDED ELECTIVES**

For students interested in studying physical chemistry in graduate school:

- Calculus III (MAT 211), Linear Algebra (MAT 219) and Differential Equations (MAT 222)
- General Physics III (PHY 225), Basic Electronics (PHY 226) Classical Mechanics (PHY 443) and Quantum Mechanics (PHY 447)

For students interested in studying biological chemistry in graduate school:

- Molecular Biology (BIO 450) and Biotechnology, Theory in Practice (BIO 408)

For students interested in pharmacy school:

- Microbiology (BIO 307) and Human Anatomy & Physiology (BIO 107 & 108)
- Top pharmacy schools require MAT 112. Consider taking both MAT 112 and MAT 141.

For student interested in medical or dental school:

- Genetics (BIO 404), Medical Biochemistry (BIO 440) and Human Anatomy & Physiology (BIO 107 & 108)

## OTHER IMPORTANT COURSES TO CONSIDER

### **BCH 450 Research in Biochemistry**

**3 credits**

Independent research under the direction of the biochemistry faculty. Students are required to spend 9 hours per week conducting research. Research and consultation times to be arranged after approval of department chair. *Fall/Spring*. **This course counts as a chemistry elective (CE), biochemistry elective (BCE), or a science elective (SE).**

### **BCH 451 Research in Biochemistry**

**4 credits**

Independent research under the direction of the biochemistry faculty. Students are required to spend 12 hours per week conducting research. Research and consultation times to be arranged after approval of department chair. *Fall/Spring*. **This course counts as a chemistry elective + lab (CE + L), biochemistry elective + lab (BCE + L), or a science elective + lab (SE + L).**

### **CHM 450: Research in Chemistry**

**3 credits**

Independent research under the direction of a member of the chemistry faculty. Students are required to spend 9 hours per week conducting research. Research and consultation times to be arranged after approval of department chair. *Fall/Spring*. **This course counts as a chemistry elective (CE), biochemistry elective (BCE), or a science elective (SE).**

### **CHM 451: Research in Chemistry**

**4 credits**

Independent research under the direction of a member of the chemistry faculty. Students are required to spend 12 hours per week conducting research. Research and consultation times to be arranged after approval of department chair. *Fall/Spring*. **This course counts as a chemistry elective + lab (CE + L), biochemistry elective + lab (BCE + L), or a science elective + lab (SE + L).**

### **CHM 490: Internships in Chemistry & Biochemistry**      **3 credits**

Internships in chemical or biochemical industry under the direction of company and faculty supervisors. *Prerequisite:* Permission of the department chair. *Fall/Spring*  
For information about internships, please see the department webpage at:

<http://www.canisius.edu/chemistry/courses.asp>.

## EXTRACURRICULAR ACTIVITIES IN THE SCIENCES

Student Chapter of the American Chemical Society (ACS).

Find us on Facebook, Angel, and the web:

<http://www3.canisius.edu/~acs/ACS/home.html>

Advisor: Dr. Sheridan

Chem for Kids (Chemistry demonstrations at local schools by ACS)

Physics Club

Pharmacy Club (Find us on Angel!)

Advisor: Dr. Disney

Colleges Against Cancer

Pre-Med Club

Pre-Vet Club

Pre-Health Professions Club

## INFORMATION FOR STUDENTS INTERESTED IN ATTENDING GRADUATE SCHOOL

### FRESHMAN YEAR

- Keep your text books, quizzes, and exams (good resources for upper level courses, studying for the GRE, etc.).
- In November, ask faculty about conducting summer research.
- Get involved in 2-3 clubs or extracurricular activities. (But don't over-commit!)

### SOPHOMORE YEAR

- Keep your text books, quizzes, and exams.
- Complete summer research at Canisius College, another university, or a company such as Merck, Wyeth, or Glaxco. For a list of available internships, consult the department webpage (<http://www.canisius.edu/chemistry>).
- Consider applying for Research Experience for Undergraduates (REU) programs ([http://www.nsf.gov/crssprgm/reu/reu\\_search.cfm](http://www.nsf.gov/crssprgm/reu/reu_search.cfm)), summer research at Roswell Park Cancer Institute, etc. These applications are often due early in the Spring semester.
- Consider taking CHM 450, BCH 450 or CHM 490 in junior year.

### JUNIOR YEAR

- Keep your text books, quizzes, and exams.
- Consider taking CHM 450, BCH 450 or CHM 490.
- Complete summer research at Canisius College, another university, or a company such as Merck, Wyeth, or Glaxo. For a list of available internships, consult the department webpage (<http://www.canisius.edu/chemistry>).
- Consider applying for Research Experience for Undergraduates (REU) programs ([http://www.nsf.gov/crssprgm/reu/reu\\_search.cfm](http://www.nsf.gov/crssprgm/reu/reu_search.cfm)), summer research at Roswell Park Cancer Institute, etc. These applications are often due early in the Spring semester.

- In the summer, start researching graduate programs:  
Grad Schools.com: <http://www.gradschools.com/Subject/Chemistry/64.html>  
PhDs.org: <http://graduate-school.phds.org/rankings/chemistry>  
American Chemical Society: <http://www.chemistry.org>

## SENIOR YEAR

- Keep your text books, quizzes, and exams.
- Consider taking CHM 450/451, BCH 450/451, or CHM 490.
- **In September, sign up to take the general GRE and the subject test in chemistry or biochemistry in October or November (<http://www.ets.org/gre/>)**
- Apply to graduate programs (many are online) by December or January.

## INFORMATION FOR STUDENTS INTERESTED IN ATTENDING MEDICAL OR DENTAL SCHOOL

### FRESHMAN YEAR

- Keep your text books, quizzes, and exams (good resources for upper level courses, studying for the MCAT or the DAT, etc.).
- Get involved in 2-3 clubs or extracurricular activities. (But don't over-commit!)
- **In the summer, you should be either conducting research or shadowing health professionals. Start arranging EARLY, around November, by talking to faculty in the Chemistry & Biochemistry Department or to Dr. Hechtel, Director of Pre-Health Programs.**

### SOPHOMORE YEAR

- Keep your text books, quizzes, and exams.
- During the school year, shadow health professionals or arrange to volunteer at Sisters of Charity, etc.
- In November, talk to faculty about conducting summer research at Canisius.
- **When registering for courses for Fall semester of your Junior Year, talk with your advisor about arranging your course load so that it is lighter in the Spring. You'll need to be studying for your MCAT or DAT.**
- **Consider taking the MCAT or DAT during the summer.**
- **During the summer, you should be: conducting research or shadowing health professionals. Start arranging EARLY, around November, by talking to faculty in the Chemistry & Biochemistry Department or to Dr. Hechtel, Director of Pre-Health Programs.**

### JUNIOR YEAR

- Keep your text books, quizzes, and exams.
- During the school year, shadow health professionals or arrange to volunteer at Sisters of Charity, etc.

- **In October or November, sign-up to take the MCAT or DAT.** Consider taking a review course (\$\$\$)

To sign up for the MCAT, go to: <http://www.aamc.org/students/mcat/>

To sign up for the DAT, go to: <http://www.ada.org/prof/ed/testing/dat/>

- **In late October / beginning of November, ask faculty if they can submit a letter of recommendation on your behalf to HSARC.** Provide them with a copy of your resume. A request for letters at the last minute reflects poorly on you!
- **In November, start preparing your HSARC application.** It reflects poorly on you to submit your application package late.
- In November, talk to faculty about conducting summer research at Canisius.
- In May, determine to which medical or dental schools you would like to apply.

Descriptions of MD (allopathic) programs can be found at: <http://www.aamc.org/medicalschoools.htm>

Descriptions of DO (osteopathic) programs can be found at: <http://www.aacom.org/resources/bookstore/cib/Pages/default.aspx>

Descriptions of DDS programs can be found at: [http://www.ada.org/prof/ed/programs/search\\_ddsdmd\\_us.asp](http://www.ada.org/prof/ed/programs/search_ddsdmd_us.asp)

- **By the beginning of May, start completing your medical or dental school applications.** Ask faculty if they will review your personal statement and activities list and descriptions.
- **By the end of May, complete your medical school or dental school applications.** You will want to submit your applications the first day you are able (usually June 2<sup>nd</sup> or 3<sup>rd</sup>).

To apply to medical schools granting MD's use the American Medical College Application Service (AMCAS): <http://www.aamc.org/students/amcas/start.htm>

To apply to medical schools granting DO's use the American Association of Colleges of Osteopathic Medicine (AACOM): <http://www.aacom.org/InfoFor/applicants/Pages/default.aspx>

However, some schools require you send an application package directly to them.

To apply to dental schools use the American Dental Education Association (ADEA):

[http://www.aeda.org/dental\\_education\\_pathways/aadsas/Pages/default.aspx](http://www.aeda.org/dental_education_pathways/aadsas/Pages/default.aspx)

However, some schools require you send an application package directly to them.

- **\*Most medical schools and dental schools use rolling admissions. Therefore, applicants are reviewed and accepted continuously. If you apply late, fewer slots will be available than if you apply early.**
- **During the summer, you should be: conducting research or shadowing health professionals. Start arranging EARLY, around November, by talking to faculty in the Chemistry & Biochemistry Department or to Dr. Hechtel, Director of Pre-Health Programs.**

## SENIOR YEAR

- Keep your text books, quizzes, and exams.
- During the school year, shadow health professionals or arrange to volunteer at Sisters of Charity, etc.
- In September, arrange for mock interviews with Dr. Hechtel.

# INFORMATION FOR STUDENTS INTERESTED IN ATTENDING PHARMACY SCHOOL

## FRESHMAN YEAR

- Keep your text books, quizzes, and exams (good resource for upper level courses, studying for the PCAT, etc.).
- Get involved in 2-3 clubs or extracurricular activities. (But don't over-commit!)
- **In the summer, you should be either working as a pharmacy technician, shadowing pharmacists, or conducting research. Start arranging EARLY, around November, by talking to faculty in the Chemistry & Biochemistry Department or to Dr. Hechtel, Director of Pre-Health Programs.**
- \*Pharmacy Schools realize that there are limited numbers of pharm tech positions. They are looking for a commitment to patient care. Therefore any relevant health care experience builds your resume.

## SOPHOMORE YEAR

- Keep your text books, quizzes, and exams.
- During the school year, shadow pharmacists or arrange to volunteer at Sisters of Charity, etc.
- In November, talk to faculty about conducting summer research at Canisius.
- **When registering for courses for Fall semester of your Junior Year, talk with your advisor about:**
  1. **arranging your course load so that it is lighter in the Spring. You'll need to be studying for your PCAT.**
  2. **what electives or upper level biology courses you should be taking in order to meet requirements for pharmacy school. Please consult Pharmacy Club's Angel page for important information.**
- Consider taking the PCAT during the summer.
- **During the summer, you should be: conducting research or shadowing health professionals. Start arranging EARLY, around November, by talking to faculty in the Chemistry & Biochemistry Department or to Dr. Hechtel, Director of Pre-Health Programs.**

## JUNIOR YEAR

- Keep your text books, quizzes, and exams.
- During the school year, shadow pharmacists or arrange to volunteer at Sisters of Charity, etc.
- **In October or November, sign-up to take the PCAT.** Consider taking a review course (\$\$\$). To sign up or for information go to: <http://tpc-etesting.com/pcat/>
- In November, talk to faculty about conducting summer research at Canisius.
- **In March, ask faculty or pharmacists if they could submit a letter of recommendation on your behalf.** Provide them with a copy of your resume. It reflects poorly on you if you ask for letters at the last minute.
- In May, determine which pharmacy schools to which you will apply. Description of PharmD programs are available from Pharmacy College Application Service (PharmCAS) at: <http://www.pharmcas.org/collegesschools/schoolpages.htm>
- **In the middle of May, start completing your pharmacy school applications.** Ask faculty if they will review your personal statement and activities list and descriptions.
- **By the middle of June, complete your pharmacy school applications.** You will want to submit your applications the first day you are able (usually around July 1<sup>st</sup>). Most pharmacy schools use PharmCAS: <http://www.pharmcas.org/>
- **\*Most pharmacy schools use rolling admissions. Therefore, applicants are reviewed and accepted continuously. If you apply late, fewer slots will be available than if you apply early.**
- **During the summer, you should be: conducting research or shadowing health professionals. Start arranging EARLY, around November, by talking to faculty in the Chemistry & Biochemistry Department or to Dr. Hechtel, Director of Pre-Health Programs.**

## SENIOR YEAR

- Keep your text books, quizzes, and exams.
- During the school year, shadow pharmacists or arrange to volunteer at Sisters of Charity, etc.
- In September, arrange for mock interviews with Dr. Hechtel.

## MEET THE FACULTY & STAFF

### **Mariusz Kozik**

Department Chair / Professor of Inorganic Chemistry  
PhD, Georgetown University

kozik@canisius.edu / HO 206 / (716) 888-2337

Teaching areas include general chemistry, inorganic, organometallic and bioinorganic chemistry. Research interests are in the structures of polyoxometallates and their practical applications, most recently on carbon dioxide activation. Dr. Kozik is the 2008 recipient of the College of Arts and Sciences Faculty Service Award.

### **Jessica Childs-Disney**

Assistant Professor of Biochemistry  
PhD, University of Rochester

childsdj@canisius.edu / HO 101A / (716) 888-2342

Teaching areas include biochemistry and nucleic acids. Research interests are in RNA biophysical chemistry, specifically using information about RNA folding to design therapeutics and probes of RNA function.

### **Frank Dinan**

Professor of Organic Chemistry  
PhD, SUNY at Buffalo

dinan@canisius.edu / HO 207A / (716) 888-2399

Teaching areas include organic and polymer chemistry, case-studies based chemistry, and technology and literature. Research interests are in organic synthesis, polymer structure studies and innovative teaching strategies. Dr. Dinan is the 2008 recipient of the College of Arts and Sciences Full-time Faculty Teaching Award.

### **Timothy Gregg**

Assistant Professor of Organic Chemistry  
PhD, University of Arizona

greggt@canisius.edu / HO 210A / (716) 888-2259

Teaching areas include organic chemistry and spectroscopy. Research interests are in organic synthesis, reaction mechanisms and the medicinal chemistry of neurotransmitter modulators.

### **Roberto Ma. Gregorius**

Associate Professor of Education  
Director, Chemical Education Leadership Program  
PhD, University of Massachusetts at Amherst (Polymer Science & Engineering)

gregorir@canisius.edu / CT 805 / (716) 888-3701

Teaching areas include general chemistry and science education. Research interests include Chemical Education: student-centered teaching and learning protocols suitable for both high school and first year college chemistry.

### **Mary O'Sullivan**

Professor of Organic Chemistry  
PhD, University of Newcastle upon Tyne, U.K.

osulliv1@canisius.edu / HO 205 / (716) 888-2352

Teaching areas include organic chemistry, biological organic chemistry and spectroscopy. Research interests are in enzyme inhibition and the development of novel anti-parasitic agents, specifically new compounds designed to combat diseases caused by trypanosomes. Dr. O'Sullivan is the 2009 recipient of the College of Arts and Sciences Faculty Service Award.

### **Peter Schaber**

Professor of Analytical Chemistry  
PhD, SUNY at Buffalo

schaber@canisius.edu / HO 302 / (716) 888-2351

Teaching areas include general and analytical chemistry. Research interests are in the synthesis, characterization and reactivity of transition metal complexes in "unusual" coordination spheres and the analysis of heavy metals in water and food.

### **Phillip Sheridan**

Assistant Professor of Physical Chemistry  
PhD, University of Arizona

phillip.sheridan@canisius.edu / HO 310A / (716) 888-2347

Teaching areas include general and physical chemistry. Research interests are in the electronic, bonding and geometric properties of small metal-containing radicals, which are studied in the gas-phase using high-resolution laser spectroscopy.

### **Steven Szczepankiewicz**

Associate Professor of Analytical Chemistry  
PhD, California Institute of Technology

szczepas@canisius.edu / HO 306 / (716) 888-2355

Teaching areas include general, analytical and environmental chemistry. Research interests are in the study of surface interactions with applications towards the development of new sensor technologies and photochemistry. Dr. Szczepankiewicz is also the Director of the Middle School Summer Science Camp.

### **Joseph Bieron**

Professor *Emeritus* of Organic Chemistry  
PhD, SUNY at Buffalo

bieron@canisius.edu / HO 401 / (716) 888-2357

Canisius College Distinguished Professor, 1983. WNY-ACS Schoellkopf Medal recipient, 1993. Research interests are in organic synthesis, NMR spectroscopy, and innovative teaching strategies.

### **Kristina (Krit) Marohn**

General Chemistry Laboratory Coordinator  
MS, SUNY Fredonia

marohnk@canisius.edu / HO 211A / (716) 888-2348

Teaching areas include general chemistry laboratory classes. Professional experience includes a position as an Associate Engineer at AVOX Systems.

### **James Maul**

Adjunct Professor of Organic Chemistry  
PhD, Wayne State University

maulj@canisius.edu / HO 308 / (716) 888-2356

Teaching areas include organic chemistry laboratory classes. Professional experience includes a position as Senior Scientist at Occidental Chemical Corporation Technology Center.

**Thomas Stabler**

Director of Chemistry Laboratories  
MS in Chemistry, Canisius College

stabler@canisius.edu / HO 209 / (716) 888-2344

**Alice Steltermann**

Departmental Secretary

stelterm@canisius.edu / HO 206 / (716) 888-2340

## COURSE DESCRIPTIONS

### CHEMISTRY CURRICULUM

#### **CHM 104 Energy, Environment, and Society 3 credits**

Designed to provide a better understanding of energy and our environment, including man's interaction with his environment and the consequences facing society today. *Fall*

#### **CHM 105 Chemistry: A Human Perspective 3 credits**

Fundamental principles of chemical theory are presented by examining how key ideas came to fruition in the context of the times and individuals involved. This course is designed to instill an understanding of the sciences upon which important scientific and technological issues facing society today are based. *Spring*

#### **CHM 106 The Chemistry of Life 3 credits**

The role of chemistry, specifically the chemistry of carbon, in life processes and the treatment of disease. *Spring*

#### **CHM 107 Chemistry by the Case 3 credits**

Team learning is used to teach important concepts in science with an emphasis on chemistry. These concepts are then used to analyze important science/technology based contemporary issues using the case study method.

#### **CHM 111-112 General Chemistry 8 credits**

Emphasizes physical chemical principles. Includes atomic structure and periodicity, chemical bonding, kinetics, equilibrium, electrochemistry and periodic chemical properties. Laboratory includes quantitative and qualitative analysis. Three lectures, one laboratory and one recitation per week. *Prerequisite* for CHM112: CHM 111 with a minimum grade of C- *Fall and Spring*

#### **CHM 227-228 Organic Chemistry 8 credits**

Fundamental treatment of organic chemistry. Mechanisms, structure and synthetic methods. Laboratory covers techniques of separation, purification, analysis and organic synthesis. Three lectures, one laboratory and one recitation per week. *Prerequisites*: CHM 111-112; a minimum grade of C- in CHM 227 is required to enroll in CHM 228. *Fall and Spring*

#### **CHM 230 Analytical Chemistry I 4 credits**

Principles and methodology of modern analytical chemistry presented with particular emphasis on chromatographic, spectrophotometric and electroanalytical techniques. Three lectures, one laboratory and one recitation per week. *Prerequisite*: CHM 112 with a minimum grade of C-. *Spring*

#### **CHM 232 Analytical Environmental Chemistry 4 credits**

First-level analytical course. Environmental applications. Sampling techniques and statistical analysis of data. Soil chemistry, aquatic chemistry and atmospheric chemistry.

Trace analysis with electroanalytical, liquid and gas chromatography, atomic absorption spectroscopy and ion selective electrodes. *Prerequisites:* CHM 111-112. *Spring 2010.*

**CHM 244 Advanced Inorganic Chemistry 3 credits**

Periodic classification of the elements, electronic configuration of atoms, nature of chemical bonding, symmetry and group theory, coordination compounds and other aspects of modern inorganic chemistry. *Prerequisites:* CHM 227-228. *Fall 2010.*

**CHM 301 Classical Physical Chemistry 3 credits**

Principles of thermodynamics with applications to phase and chemical equilibria. Kinetic theory of gases and chemical kinetics. Three lectures and one recitation per week. *Prerequisites:* CHM 111-112, MAT 111, PHY 201-202 or 223-224, or equivalent courses. *Fall*

**CHM 301L Classical Physical Chemistry Laboratory 1 credit**

Selected experiments demonstrating principles of thermodynamics and chemical kinetics. One four-hour lab per week. *Prerequisite:* CHM 301 or concurrent registration in CHM 301. *Fall*

**CHM 302 Modern Physical Chemistry 3 credits**

Introduction to quantum chemistry with applications to the structure of atoms and molecules. Molecular spectroscopy. Three lectures and one recitation per week. *Prerequisites:* CHM 112 with a minimum grade of C-, MAT 111-112, PHY 201-202 or 223-224, or equivalent courses. *Spring*

**CHM 302L Modern Physical Chemistry Laboratory 1 credit**

Selected spectroscopic experiments with applications to molecular structure. One four-hour lab per week. *Prerequisites:* CHM 302 or concurrent registration in CHM 302 and CHM230L or CHM301L or CHM334L or CHM430L with the minimum grade of C-. *Spring*

**CHM 334 Spectrometric Analysis 4 credits**

Spectrometric methods for the elucidation of chemical structures. Includes nuclear magnetic resonance, infrared, ultraviolet and mass spectrometry. Emphasis on organic compounds. Three lectures and one laboratory per week. *Prerequisites:* CHM 227-228. *Fall*

**CHM338 Intermediate Organic Chemistry 3 credits**

Important basic concepts in organic chemistry are reviewed at a higher level than is possible in an introductory course. New concepts are presented in the area of reaction mechanisms, physical organic chemistry, and in the use of retrosynthetic analysis to plan multi-step organic syntheses. *Prerequisites:* CHM 227-228. *Fall 2009.*

**CHM 344 Metal Ions in Biological Systems 3 credits**

An interdisciplinary course taught by a chemistry and a biology professor. Intended for science majors as an elective in either chemistry, biochemistry or biology. Chemical

processes in biological systems, which include participation of metal ions, are covered. The course begins with the principles of coordination chemistry and structural biochemistry. The rest of the course is organized according to the functions performed by the metal centers: gene expression and signal transduction, digestion, bioenergetics and electron transfer, oxygen transport, liver functions and anticancer drugs.  
*Prerequisites:* BIO 101 and CHM 227-228. *Fall 2009.*

**CHM 381-480-481 Chemistry and Biochemistry Seminar 1 credit each**

Student-faculty seminar for majors. To be taken for three semesters. *Prerequisite:* CHM 228 and Junior standing. *Spring - Fall - Spring*

**CHM 401 Modern Synthetic Methods 3 credits**

Structure-reactivity relationships in organometallic chemistry and the application of organometallic compounds in organic synthesis, including industrial catalysis.  
*Prerequisite:* CHM 228. *Spring 2011.*

**CHM 401L Modern Synthetic Methods Laboratory 1 credit**

Designed to illustrate some of the most important synthetic and physical techniques used by modern synthetic chemists. *Prerequisite:* CHM 401 or concurrent registration in CHM 401. *Spring 2011.*

**CHM 430 Analytical Chemistry II 4 credits**

Advanced instrumental methods of analysis including spectroscopy, chromatography and various electrochemical techniques. Three lectures and one laboratory per week.  
*Prerequisites:* CHM 111-112 or approval of instructor.

**CHM 450 Research in Chemistry 3 credits**

Independent research under the direction of a member of the chemistry faculty. Students are required to spend 9 hours per week conducting research. Research and consultation times to be arranged after approval of department chair. *Fall/Spring*

**CHM 451 Research in Chemistry 4 credits**

Independent research under the direction of a member of the chemistry faculty. Students are required to spend 12 hours per week conducting research. Research and consultation times to be arranged after approval of department chair. *Fall/Spring*

**CHM 455 Medicinal Chemistry 3 credits**

Chemical principles are used to explain the interaction of drugs with biological targets. Strategies used in the design and development of medicines are discussed.  
*Prerequisites:* CHM227-228 and BCH301. *Spring 2011*

**CHM 461 Polymer Chemistry 3 credits**

Survey of the physical and organic principles of polymer chemistry, with special emphasis on industrial applications. *Prerequisites:* CHM 227-228. *Fall 2010.*

**CHM 490 Internships in Chemistry & Biochemistry 3 credits**

Internships in chemical or biochemical industry under the direction of company and faculty supervisors. *Prerequisite:* Permission of the department chair. *Fall/Spring*

For information about internships, please see the department webpage at:

<http://www.canisius.edu/chemistry/courses.asp>.

**CHM 498-499 Independent Study 3 credits**

Independent study under the direction of the chemistry staff. *Prerequisite:* Permission of the department chair. *Fall/Spring*

**BIOCHEMISTRY CURRICULUM****BCH 301 Introduction to Biochemistry 3 credits**

Structure and function of biological molecules including proteins, carbohydrates, nucleic acids and lipids. Topics include transmission of genetic information from DNA to RNA to protein; recombinant DNA technology, catalysis and enzyme kinetics, ligand binding, signal transduction and membrane transport. *Prerequisites:* BIO 101 and CHM 228 with a minimum grade of C-. *Fall*

**BCH 301L Introduction to Biochemistry Lab 1 credit**

One four-hour lab per week. *Prerequisite:* BCH 301 or concurrent registration in BCH 301. *Fall*

**BCH 302 Cellular Biochemistry 3 credits**

The more biological aspects of biochemistry. Topics include bioenergetics, anabolism and catabolism of carbohydrates, lipids, proteins and control of metabolism, emphasizing hormones. *Prerequisite:* BCH 301 with a minimum grade of C-. *Spring*

**BCH 302L Cellular Biochemistry Lab 1 credit**

One four-hour lab per week. *Prerequisites:* BCH 301L and BCH302 (or concurrent registration in BCH 302). *Spring*

**BCH 450 Research in Biochemistry 3 credits**

Independent research under the direction of the biochemistry faculty. Students are required to spend 9 hours per week conducting research. Research and consultation times to be arranged after approval of department chair. *Fall/Spring*

**BCH 451 Research in Biochemistry 4 credits**

Independent research under the direction of the biochemistry faculty. Students are required to spend 12 hours per week conducting research. Research and consultation times to be arranged after approval of department chair. *Fall/Spring*

**Chemistry ACS Certified Track: Course Completion Checklist**  
**MAJOR REQUIREMENTS**

- |  |  |
|--|--|
| <input type="checkbox"/> CHM 111 + L _____ | <input type="checkbox"/> CHM 112 + L _____ |
| <input type="checkbox"/> BIO 101 + L _____ |  |
| <input type="checkbox"/> MAT 111 _____     | <input type="checkbox"/> MAT 112 _____     |
| <input type="checkbox"/> PHY 223 + L _____ | <input type="checkbox"/> PHY 224 + L _____ |
| <input type="checkbox"/> CHM 227 + L _____ | <input type="checkbox"/> CHM 228 + L _____ |
| <input type="checkbox"/> CHM 244 _____     | <input type="checkbox"/> CHM 230 + L _____ |
| <input type="checkbox"/> CHM 301 + L _____ | <input type="checkbox"/> CHM 302 + L _____ |
| <input type="checkbox"/> CHM 334 + L _____ | <input type="checkbox"/> CHM 430 + L _____ |
| <input type="checkbox"/> BCH 301 _____     | <input type="checkbox"/> CE _____          |
| <input type="checkbox"/> CE _____          | <input type="checkbox"/> CE + L _____      |
| <input type="checkbox"/> CHM 381 _____     | <input type="checkbox"/> CHM 480 _____     |
| <input type="checkbox"/> CHM 481 _____     |  |

**CORE REQUIREMENTS**

- |   |                                  |
|---|----------------------------------|
| <input type="checkbox"/> FYS 101                                | <input type="checkbox"/> ENG 101 |
| <input type="checkbox"/> PHI 101                                | <input type="checkbox"/> RST 101 |
| <input type="checkbox"/> Field 1 Religious Studies and Theology | Course Name: _____               |
| <input type="checkbox"/> Field 2 Philosophy                     | Course Name: _____               |
| <input type="checkbox"/> Field 3 Arts                           | Course Name: _____               |
| <input type="checkbox"/> Field 4 History                        | Course Name: _____               |
| <input type="checkbox"/> Field 5 Social Sciences                | Course Name: _____               |
| <input type="checkbox"/> CORE CAPSTONE                          | Course Name: _____               |
| <input type="checkbox"/> Diversity                              | Course Name: _____               |
| <input type="checkbox"/> Ethics                                 | Course Name: _____               |
| <input type="checkbox"/> Global Awareness                       | Course Name: _____               |
| <input type="checkbox"/> Justice                                | Course Name: _____               |
| <input type="checkbox"/> Advanced Writing-intensive             | Course Name: _____               |
| <input type="checkbox"/> Oral Communication                     | Course Name: _____               |

**Chemistry Track: Course Completion Checklist**  
**MAJOR REQUIREMENTS**

- |  |  |
|--|--|
| <input type="checkbox"/> CHM 111 + L _____ | <input type="checkbox"/> CHM 112 + L _____ |
| <input type="checkbox"/> BIO 101 + L _____ |  |
| <input type="checkbox"/> MAT 111 _____     | <input type="checkbox"/> MAT 112/141 _____ |
| <input type="checkbox"/> PHY 201 + L _____ | <input type="checkbox"/> PHY 202 + L _____ |
| <input type="checkbox"/> CHM 227 + L _____ | <input type="checkbox"/> CHM 228 + L _____ |
| <input type="checkbox"/> CHM 244 _____     | <input type="checkbox"/> CHM 230 + L _____ |
| <input type="checkbox"/> CHM 301 + L _____ | <input type="checkbox"/> CHM 334 + L _____ |
| <input type="checkbox"/> CHM 430 + L _____ | <input type="checkbox"/> BCH 301 _____     |
| <input type="checkbox"/> CE _____          | <input type="checkbox"/> CE _____          |
| <input type="checkbox"/> CE + L _____      | <input type="checkbox"/> CHM 381 _____     |
| <input type="checkbox"/> CHM 480 _____     | <input type="checkbox"/> CHM 481 _____     |

**CORE REQUIREMENTS**

- |   |                                  |
|---|----------------------------------|
| <input type="checkbox"/> FYS 101                                | <input type="checkbox"/> ENG 101 |
| <input type="checkbox"/> PHI 101                                | <input type="checkbox"/> RST 101 |
| <input type="checkbox"/> Field 1 Religious Studies and Theology | Course Name: _____               |
| <input type="checkbox"/> Field 2 Philosophy                     | Course Name: _____               |
| <input type="checkbox"/> Field 3 Arts                           | Course Name: _____               |
| <input type="checkbox"/> Field 4 History                        | Course Name: _____               |
| <input type="checkbox"/> Field 5 Social Sciences                | Course Name: _____               |
| <input type="checkbox"/> CORE CAPSTONE                          | Course Name: _____               |
| <input type="checkbox"/> Diversity                              | Course Name: _____               |
| <input type="checkbox"/> Ethics                                 | Course Name: _____               |
| <input type="checkbox"/> Global Awareness                       | Course Name: _____               |
| <input type="checkbox"/> Justice                                | Course Name: _____               |
| <input type="checkbox"/> Advanced Writing-intensive             | Course Name: _____               |
| <input type="checkbox"/> Oral Communication                     | Course Name: _____               |

## Chemistry Health Professions Track: Course Completion Checklist

### MAJOR REQUIREMENTS

- |  |  |
|--|--|
| <input type="checkbox"/> CHM 111 + L _____ | <input type="checkbox"/> CHM 112 + L _____   |
| <input type="checkbox"/> BIO 101 + L _____ | <input type="checkbox"/> BIO 102 + L _____   |
| <input type="checkbox"/> MAT 111 _____     | <input type="checkbox"/> MAT 112 / 141 _____ |
| <input type="checkbox"/> PHY 201 + L _____ | <input type="checkbox"/> PHY 202 + L _____   |
| <input type="checkbox"/> CHM 227 + L _____ | <input type="checkbox"/> CHM 228 + L _____   |
| <input type="checkbox"/> CHM 244 _____     | <input type="checkbox"/> CHM 230 + L _____   |
| <input type="checkbox"/> CHM 301 _____     |  |
| <input type="checkbox"/> BCH 301 _____     | <input type="checkbox"/> BCH 302 _____       |
| <input type="checkbox"/> CE + L _____      | <input type="checkbox"/> SE + L _____        |
| <input type="checkbox"/> SE _____          | <input type="checkbox"/> CHM 381 _____       |
| <input type="checkbox"/> CHM 480 _____     | <input type="checkbox"/> CHM 481 _____       |

### **CORE REQUIREMENTS**

- |   |                                  |
|---|----------------------------------|
| <input type="checkbox"/> FYS 101                                | <input type="checkbox"/> ENG 101 |
| <input type="checkbox"/> PHI 101                                | <input type="checkbox"/> RST 101 |
| <input type="checkbox"/> Field 1 Religious Studies and Theology | Course Name: _____               |
| <input type="checkbox"/> Field 2 Philosophy                     | Course Name: _____               |
| <input type="checkbox"/> Field 3 Arts                           | Course Name: _____               |
| <input type="checkbox"/> Field 4 History                        | Course Name: _____               |
| <input type="checkbox"/> Field 5 Social Sciences                | Course Name: _____               |
| <input type="checkbox"/> CORE CAPSTONE                          | Course Name: _____               |
| <input type="checkbox"/> Diversity                              | Course Name: _____               |
| <input type="checkbox"/> Ethics                                 | Course Name: _____               |
| <input type="checkbox"/> Global Awareness                       | Course Name: _____               |
| <input type="checkbox"/> Justice                                | Course Name: _____               |
| <input type="checkbox"/> Advanced Writing-intensive             | Course Name: _____               |
| <input type="checkbox"/> Oral Communication                     | Course Name: _____               |

## Chemistry ACS Certified Track with Business Minor: Course Completion Checklist

### MAJOR REQUIREMENTS

- |  |  |
|--|--|
| <input type="checkbox"/> CHM 111 + L _____ | <input type="checkbox"/> CHM 112 + L _____ |
| <input type="checkbox"/> BIO 101 + L _____ |  |
| <input type="checkbox"/> MAT 111 _____     | <input type="checkbox"/> MAT 112 _____     |
| <input type="checkbox"/> PHY 223 + L _____ | <input type="checkbox"/> PHY 224 + L _____ |
| <input type="checkbox"/> CHM 227 + L _____ | <input type="checkbox"/> CHM 228 + L _____ |
| <input type="checkbox"/> CHM 244 _____     | <input type="checkbox"/> CHM 230 + L _____ |
| <input type="checkbox"/> CHM 301 + L _____ | <input type="checkbox"/> CHM 302 + L _____ |
| <input type="checkbox"/> CHM 334 + L _____ | <input type="checkbox"/> CHM 430 + L _____ |
| <input type="checkbox"/> BCH 301 _____     | <input type="checkbox"/> CE _____          |
| <input type="checkbox"/> CE + L _____      | <input type="checkbox"/> CE _____          |
| <input type="checkbox"/> CHM 381 _____     | <input type="checkbox"/> CHM 480 _____     |
| <input type="checkbox"/> CHM 481 _____     |  |

### MINOR REQUIREMENTS

- |   |  |
|---|--|
| <input type="checkbox"/> ECO 101 _____            | <input type="checkbox"/> ECO 102 _____ |
| <input type="checkbox"/> MGT 101 _____            | <input type="checkbox"/> MKT 201 _____ |
| <input type="checkbox"/> ACC 201 _____            | <input type="checkbox"/> FIN 201 _____ |
| <input type="checkbox"/> MAT 141 or ECO 255 _____ |  |

### CORE REQUIREMENTS

- |   |                                  |
|---|----------------------------------|
| <input type="checkbox"/> FYS 101                                | <input type="checkbox"/> ENG 101 |
| <input type="checkbox"/> PHI 101                                | <input type="checkbox"/> RST 101 |
| <input type="checkbox"/> Field 1 Religious Studies and Theology | Course Name: _____               |
| <input type="checkbox"/> Field 2 Philosophy                     | Course Name: _____               |
| <input type="checkbox"/> Field 3 Arts                           | Course Name: _____               |

- Field 4 History
- Field 5 Social Sciences
- CORE CAPSTONE
- Diversity
- Ethics
- Global Awareness
- Justice
- Advanced Writing-intensive
- Oral Communication

Course Name: \_\_\_\_\_

Course Name: ECO 101

Course Name: \_\_\_\_\_

Course Name: \_\_\_\_\_

Course Name: \_\_\_\_\_

Course Name: \_\_\_\_\_

Course Name: \_\_\_\_\_

Course Name: \_\_\_\_\_

Course Name: \_\_\_\_\_

## Chemistry Track with Business Minor: Course Completion Checklist

### MAJOR REQUIREMENTS

- |  |  |
|--|--|
| <input type="checkbox"/> CHM 111 + L _____ | <input type="checkbox"/> CHM 112 + L _____ |
| <input type="checkbox"/> BIO 101 + L _____ | <input type="checkbox"/> MAT 111 _____     |
| <input type="checkbox"/> PHY 201 + L _____ | <input type="checkbox"/> PHY 202 + L _____ |
| <input type="checkbox"/> CHM 227 + L _____ | <input type="checkbox"/> CHM 228 + L _____ |
| <input type="checkbox"/> CHM 244 _____     | <input type="checkbox"/> CHM 230 + L _____ |
| <input type="checkbox"/> CHM 301 + L _____ | <input type="checkbox"/> CHM 334 + L _____ |
| <input type="checkbox"/> CHM 430 + L _____ | <input type="checkbox"/> BCH 301 _____     |
| <input type="checkbox"/> CE _____          | <input type="checkbox"/> CE + L _____      |
| <input type="checkbox"/> CE _____          | <input type="checkbox"/> CHM 381 _____     |
| <input type="checkbox"/> CHM 480 _____     | <input type="checkbox"/> CHM 481 _____     |

### MINOR REQUIREMENTS

- |   |  |
|---|--|
| <input type="checkbox"/> ECO 101 _____  | <input type="checkbox"/> ECO 102 _____ |
| <input type="checkbox"/> MGT 101 _____  | <input type="checkbox"/> MKT 201 _____ |
| <input type="checkbox"/> ACC 201 _____  | <input type="checkbox"/> FIN 201 _____ |
| <input type="checkbox"/> MAT 141 or ECO 255 (also fulfills major requirement) |  |

### CORE REQUIREMENTS

- |   |                                  |
|---|----------------------------------|
| <input type="checkbox"/> FYS 101                                | <input type="checkbox"/> ENG 101 |
| <input type="checkbox"/> PHI 101                                | <input type="checkbox"/> RST 101 |
| <input type="checkbox"/> Field 1 Religious Studies and Theology | Course Name: _____               |
| <input type="checkbox"/> Field 2 Philosophy                     | Course Name: _____               |
| <input type="checkbox"/> Field 3 Arts                           | Course Name: _____               |
| <input type="checkbox"/> Field 4 History                        | Course Name: _____               |
| <input checked="" type="checkbox"/> Field 5 Social Sciences     | Course Name: <u>ECO 101</u>      |
| <input type="checkbox"/> CORE CAPSTONE                          | Course Name: _____               |

- Diversity
- Ethics
- Global Awareness
- Justice
- Advanced Writing-intensive
- Oral Communication

Course Name: \_\_\_\_\_

Course Name: \_\_\_\_\_

Course Name: \_\_\_\_\_

Course Name: \_\_\_\_\_

Course Name: \_\_\_\_\_

Course Name: \_\_\_\_\_

## Chemistry Health Professions Track with Business Minor: Course Completion Checklist

### MAJOR REQUIREMENTS

- |  |  |
|--|--|
| <input type="checkbox"/> CHM 111 + L _____ | <input type="checkbox"/> CHM 112 + L _____ |
| <input type="checkbox"/> BIO 101 + L _____ | <input type="checkbox"/> BIO 102 + L _____ |
| <input type="checkbox"/> MAT 111 _____     |  |
| <input type="checkbox"/> PHY 201 + L _____ | <input type="checkbox"/> PHY 202 + L _____ |
| <input type="checkbox"/> CHM 227 + L _____ | <input type="checkbox"/> CHM 228 + L _____ |
| <input type="checkbox"/> CHM 244 _____     | <input type="checkbox"/> CHM 230 + L _____ |
| <input type="checkbox"/> CHM 301 _____     |  |
| <input type="checkbox"/> BCH 301 _____     | <input type="checkbox"/> BCH 302 _____     |
| <input type="checkbox"/> CE + L _____      | <input type="checkbox"/> SE + L _____      |
| <input type="checkbox"/> SE _____          | <input type="checkbox"/> CHM 381 _____     |
| <input type="checkbox"/> CHM 480 _____     | <input type="checkbox"/> CHM 481 _____     |

### MINOR REQUIREMENTS

- |   |  |
|---|--|
| <input type="checkbox"/> ECO 101 _____  | <input type="checkbox"/> ECO 102 _____ |
| <input type="checkbox"/> MGT 101 _____  | <input type="checkbox"/> MKT 201 _____ |
| <input type="checkbox"/> ACC 201 _____  | <input type="checkbox"/> FIN 201 _____ |
| <input type="checkbox"/> MAT 141 or ECO 255 (also fulfills major requirement) |  |

### CORE REQUIREMENTS

- |   |                                  |
|---|----------------------------------|
| <input type="checkbox"/> FYS 101                                | <input type="checkbox"/> ENG 101 |
| <input type="checkbox"/> PHI 101                                | <input type="checkbox"/> RST 101 |
| <input type="checkbox"/> Field 1 Religious Studies and Theology | Course Name: _____               |
| <input type="checkbox"/> Field 2 Philosophy                     | Course Name: _____               |
| <input type="checkbox"/> Field 3 Arts                           | Course Name: _____               |
| <input type="checkbox"/> Field 4 History                        | Course Name: _____               |
| <input checked="" type="checkbox"/> Field 5 Social Sciences     | Course Name: <u>ECO 101</u>      |

CORE CAPSTONE

Course Name: \_\_\_\_\_

Diversity

Course Name: \_\_\_\_\_

Ethics

Course Name: \_\_\_\_\_

Global Awareness

Course Name: \_\_\_\_\_

Justice

Course Name: \_\_\_\_\_

Advanced Writing-intensive

Course Name: \_\_\_\_\_

Oral Communication

Course Name: \_\_\_\_\_

## Biochemistry ACS Certified Track: Course Completion Checklist

### MAJOR REQUIREMENTS

- |  |   |
|--|---|
| <input type="checkbox"/> CHM 111 + L _____                       | <input type="checkbox"/> CHM 112 + L _____        |
| <input type="checkbox"/> BIO 101 + L _____                       | <input type="checkbox"/> BIO 102 + L _____        |
| <input type="checkbox"/> MAT 111 _____                           | <input type="checkbox"/> MAT 112 _____            |
| <input type="checkbox"/> PHY 223 + L _____                       | <input type="checkbox"/> PHY 224 + L _____        |
| <input type="checkbox"/> CHM 227 + L _____                       | <input type="checkbox"/> CHM 228 + L _____        |
| <input type="checkbox"/> CHM 244 _____                           | <input type="checkbox"/> CHM 230 + L _____        |
| <input type="checkbox"/> CHM 301 ( $\pm$ L) _____ (301L or 302L) | <input type="checkbox"/> CHM 302 ( $\pm$ L) _____ |
| <input type="checkbox"/> BCH 301 + L _____                       | <input type="checkbox"/> BCH 302 + L _____        |
| <input type="checkbox"/> CHM 334 + L or 430 + L _____            | <input type="checkbox"/> BCE _____                |
| <input type="checkbox"/> MOL BIO + L _____                       | <input type="checkbox"/> CHM 381 _____            |
| <input type="checkbox"/> CHM 480 _____                           | <input type="checkbox"/> CHM 481 _____            |

### CORE REQUIREMENTS

- |   |                                  |
|---|----------------------------------|
| <input type="checkbox"/> FYS 101                                | <input type="checkbox"/> ENG 101 |
| <input type="checkbox"/> PHI 101                                | <input type="checkbox"/> RST 101 |
| <input type="checkbox"/> Field 1 Religious Studies and Theology | Course Name: _____               |
| <input type="checkbox"/> Field 2 Philosophy                     | Course Name: _____               |
| <input type="checkbox"/> Field 3 Arts                           | Course Name: _____               |
| <input type="checkbox"/> Field 4 History                        | Course Name: _____               |
| <input type="checkbox"/> Field 5 Social Sciences                | Course Name: _____               |
| <input type="checkbox"/> CORE CAPSTONE                          | Course Name: _____               |
| <input type="checkbox"/> Diversity                              | Course Name: _____               |
| <input type="checkbox"/> Ethics                                 | Course Name: _____               |
| <input type="checkbox"/> Global Awareness                       | Course Name: _____               |
| <input type="checkbox"/> Justice                                | Course Name: _____               |
| <input type="checkbox"/> Advanced Writing-intensive             | Course Name: _____               |
| <input type="checkbox"/> Oral Communication                     | Course Name: _____               |

**Biochemistry Track: Course Completion Checklist**  
**MAJOR REQUIREMENTS**

- |   |  |
|---|--|
| <input type="checkbox"/> CHM 111 + L _____            | <input type="checkbox"/> CHM 112 + L _____   |
| <input type="checkbox"/> BIO 101 + L _____            | <input type="checkbox"/> BIO 102 + L _____   |
| <input type="checkbox"/> MAT 111 _____                | <input type="checkbox"/> MAT 112 / 141 _____ |
| <input type="checkbox"/> PHY 201 + L _____            | <input type="checkbox"/> PHY 202 + L _____   |
| <input type="checkbox"/> CHM 227 + L _____            | <input type="checkbox"/> CHM 228 + L _____   |
| <input type="checkbox"/> CHM 244 _____                | <input type="checkbox"/> CHM 301 _____       |
| <input type="checkbox"/> CHM 334 + L or 430 + L _____ |  |
| <input type="checkbox"/> BCH 301 + L _____            | <input type="checkbox"/> BCH 302 + L _____   |
| <input type="checkbox"/> BCE _____                    | <input type="checkbox"/> CE _____            |
| <input type="checkbox"/> MOL BIO + L _____            | <input type="checkbox"/> CHM 381 _____       |
| <input type="checkbox"/> CHM 480 _____                | <input type="checkbox"/> CHM 481 _____       |

**CORE REQUIREMENTS**

- |   |                                  |
|---|----------------------------------|
| <input type="checkbox"/> FYS 101                                | <input type="checkbox"/> ENG 101 |
| <input type="checkbox"/> PHI 101                                | <input type="checkbox"/> RST 101 |
| <input type="checkbox"/> Field 1 Religious Studies and Theology | Course Name: _____               |
| <input type="checkbox"/> Field 2 Philosophy                     | Course Name: _____               |
| <input type="checkbox"/> Field 3 Arts                           | Course Name: _____               |
| <input type="checkbox"/> Field 4 History                        | Course Name: _____               |
| <input type="checkbox"/> Field 5 Social Sciences                | Course Name: _____               |
| <input type="checkbox"/> CORE CAPSTONE                          | Course Name: _____               |
| <input type="checkbox"/> Diversity                              | Course Name: _____               |
| <input type="checkbox"/> Ethics                                 | Course Name: _____               |
| <input type="checkbox"/> Global Awareness                       | Course Name: _____               |
| <input type="checkbox"/> Justice                                | Course Name: _____               |
| <input type="checkbox"/> Advanced Writing-intensive             | Course Name: _____               |
| <input type="checkbox"/> Oral Communication                     | Course Name: _____               |

## Biochemistry ACS Certified Track with Business Minor: Course Completion Checklist

### MAJOR REQUIREMENTS

- |  |   |
|--|---|
| <input type="checkbox"/> CHM 111 + L _____                       | <input type="checkbox"/> CHM 112 + L _____        |
| <input type="checkbox"/> BIO 101 + L _____                       | <input type="checkbox"/> BIO 102 + L _____        |
| <input type="checkbox"/> MAT 111 _____                           | <input type="checkbox"/> MAT 112 _____            |
| <input type="checkbox"/> PHY 223 + L _____                       | <input type="checkbox"/> PHY 224 + L _____        |
| <input type="checkbox"/> CHM 227 + L _____                       | <input type="checkbox"/> CHM 228 + L _____        |
| <input type="checkbox"/> CHM 244 _____                           | <input type="checkbox"/> CHM 230 + L _____        |
| <input type="checkbox"/> CHM 301 ( $\pm$ L) _____ (301L or 302L) | <input type="checkbox"/> CHM 302 ( $\pm$ L) _____ |
| <input type="checkbox"/> BCH 301 + L _____                       | <input type="checkbox"/> BCH 302 + L _____        |
| <input type="checkbox"/> CHM 334 + L or 430 + L _____            | <input type="checkbox"/> BCE _____                |
| <input type="checkbox"/> MOL BIO + L _____                       | <input type="checkbox"/> CHM 381 _____            |
| <input type="checkbox"/> CHM 480 _____                           | <input type="checkbox"/> CHM 481 _____            |

### MINOR REQUIREMENTS

- |  |  |
|--|--|
| <input type="checkbox"/> ECO 101 _____           | <input type="checkbox"/> ECO 102 _____ |
| <input type="checkbox"/> MGT 101 _____           | <input type="checkbox"/> MKT 201 _____ |
| <input type="checkbox"/> ACC 201 _____           | <input type="checkbox"/> FIN 201 _____ |
| <input type="checkbox"/> MAT 141 or ECO255 _____ |  |

### CORE REQUIREMENTS

- |   |                                  |
|---|----------------------------------|
| <input type="checkbox"/> FYS 101                                | <input type="checkbox"/> ENG 101 |
| <input type="checkbox"/> PHI 101                                | <input type="checkbox"/> RST 101 |
| <input type="checkbox"/> Field 1 Religious Studies and Theology | Course Name: _____               |
| <input type="checkbox"/> Field 2 Philosophy                     | Course Name: _____               |
| <input type="checkbox"/> Field 3 Arts                           | Course Name: _____               |
| <input type="checkbox"/> Field 4 History                        | Course Name: _____               |
| <input checked="" type="checkbox"/> Field 5 Social Sciences     | Course Name: <u>ECO 101</u>      |

CORE CAPSTONE

Course Name: \_\_\_\_\_

Diversity

Course Name: \_\_\_\_\_

Ethics

Course Name: \_\_\_\_\_

Global Awareness

Course Name: \_\_\_\_\_

Justice

Course Name: \_\_\_\_\_

Advanced Writing-intensive

Course Name: \_\_\_\_\_

Oral Communication

Course Name: \_\_\_\_\_

## Biochemistry Track with Business Minor: Course Completion Checklist

### MAJOR REQUIREMENTS

- |   |  |
|---|--|
| <input type="checkbox"/> CHM 111 + L _____            | <input type="checkbox"/> CHM 112 + L _____               |
| <input type="checkbox"/> BIO 101 + L _____            | <input type="checkbox"/> BIO 102 + L _____               |
| <input type="checkbox"/> MAT 111 _____                | <input type="checkbox"/> MAT 141 (also minor req.) _____ |
| <input type="checkbox"/> PHY 201 + L _____            | <input type="checkbox"/> PHY 202 + L _____               |
| <input type="checkbox"/> CHM 227 + L _____            | <input type="checkbox"/> CHM 228 + L _____               |
| <input type="checkbox"/> CHM 244 _____                | <input type="checkbox"/> CHM 301 _____                   |
| <input type="checkbox"/> BCH 301 + L _____            | <input type="checkbox"/> BCH 302 + L _____               |
| <input type="checkbox"/> CHM 334 + L or 430 + L _____ | <input type="checkbox"/> BCE _____                       |
| <input type="checkbox"/> MOL BIO + L _____            | <input type="checkbox"/> CE or BCE _____                 |
| <input type="checkbox"/> CHM 381 _____                | <input type="checkbox"/> CHM 480 _____                   |
| <input type="checkbox"/> CHM 481 _____                |  |

### MINOR REQUIREMENTS

- |  |  |
|--|--|
| <input type="checkbox"/> ECO 101 _____ | <input type="checkbox"/> ECO 102 _____ |
| <input type="checkbox"/> MGT 101 _____ | <input type="checkbox"/> MKT 201 _____ |
| <input type="checkbox"/> ACC 201 _____ | <input type="checkbox"/> FIN 201 _____ |

### CORE REQUIREMENTS

- |   |                                  |
|---|----------------------------------|
| <input type="checkbox"/> FYS 101                                | <input type="checkbox"/> ENG 101 |
| <input type="checkbox"/> PHI 101                                | <input type="checkbox"/> RST 101 |
| <input type="checkbox"/> Field 1 Religious Studies and Theology | Course Name: _____               |
| <input type="checkbox"/> Field 2 Philosophy                     | Course Name: _____               |
| <input type="checkbox"/> Field 3 Arts                           | Course Name: _____               |
| <input type="checkbox"/> Field 4 History                        | Course Name: _____               |
| <input checked="" type="checkbox"/> Field 5 Social Sciences     | Course Name: <u>ECO 101</u>      |
| <input type="checkbox"/> CORE CAPSTONE                          | Course Name: _____               |

- Diversity
- Ethics
- Global Awareness
- Justice
- Advanced Writing-intensive
- Oral Communication

Course Name: \_\_\_\_\_

Course Name: \_\_\_\_\_

Course Name: \_\_\_\_\_

Course Name: \_\_\_\_\_

Course Name: \_\_\_\_\_

Course Name: \_\_\_\_\_