

# BIOCHEMISTRY DEGREE SPECIALIZATIONS

## FIRST AND SECOND YEAR SPECIALIZATION REQUIREMENTS

### REQUIRED COURSES

#### **First Year:**

BIOL 121	(3 credits)	<i>These courses, or equivalents, are <b>key pre-requisites</b> to required second year Chemistry and Biology courses. They <b>must</b> be completed during <b>Winter Session of 1st year</b> to be eligible to apply for 2<sup>nd</sup> year Biochemistry.</i>
CHEM 121/123	(8)	
MATH 100, 101	(6)	

#### **First or Second Years<sup>1</sup>:**

Commun. Req. <sup>2</sup>	(6)	- Communications Requirement. Usually 6 credits of first year English.
PHYS 1st <sup>3</sup>	(3)	- Students lacking PHYS 12 must take PHYS 100 and an additional 3 credits of PHYS 1st to fulfill this requirement.
BIOL 140 or 180	(2)	
BIOL 112	(3)	- Biochemistry <b>Honours</b> specialization only. Also given during the summer session.
Electives	(as needed)	- See Third/ Fourth year pages for further information about elective requirements.

<sup>1</sup>Students should not normally defer more than 3 or 6 credits of first year coursework to second year.

<sup>2</sup>The communication requirement must be completed by the end of third year. Students may use SCIE113 as part of their communication requirement. Please see: <http://www.calendar.ubc.ca/vancouver/?tree=12,215,410,1463>.

<sup>3</sup>Students in the Biochem. and Chem. **Combined Honours** specialization need to complete 6 credits of PHYS 1st.

Students are encouraged to check out the UBC calendar for the most up to date information. Please see: <http://www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,417>

### NOTES

#### **Admission to Second Year Biochemistry:**

- Students who have completed the required first year pre-requisite courses will be eligible to use the **Faculty of Science online Life Sciences application system**, which is normally available in June. Successful students are admitted directly by Science, prior to second year registration. More information about this will be available from the Faculty of Science; see also: <http://www.science.ubc.ca/students/degree/apply>.
- Students who wish to enquire about transferring from another degree specialization or another university into Biochemistry should **contact a Biochemistry adviser directly** to make their request.
- The first year Winter Session standing needed for successful admission to second year Biochemistry in previous years has been in the 70 to 76% range.

**Honours Specialization Requirements:** Students planning a Biochemistry Honours specialization should register in a minimum of 30 credits during each Winter Session and will need to maintain a minimum Winter Session average (with no failures). In previous academic sessions this average was 76%.

#### **Second Year:**

BIOC 203	(3)	<i>BIOL200, BIOC203 &amp; CHEM203/213 are key pre-requisites to 3<sup>rd</sup> year Biochemistry.</i>
BIOL 200, 234	(6)	
CHEM 203, 213	(7)	<i>The Biochemistry major and honours specializations do <b>NOT</b> require registration into a 2<sup>nd</sup> year Standard Timetable (STT). Students in a biochemistry combined major or honours are required to register into a 2<sup>nd</sup> year STT.</i>
CHEM 245	(1)	
CHEM 211	(4)	
MATH 200	(3)	<i>Students can register into MATH200 in the winter or the following summer.</i>
One of MICB 202, 211, 212	(3)	- Biochemistry <b>Honours</b> specialization only
CHEM 208	(3)	- Biochemistry and Chemistry <b>Combined Honours or majors</b> specializations only.

Students are encouraged to check out the UBC calendar for the most up to date information. Please see: <http://www.calendar.ubc.ca/vancouver/index.cfm?tree=12,215,410,417>

## SECOND YEAR SPECIALIZATION REQUIREMENTS

### **Note that:**

- **BIOL200, CHEM 203/213/245 and BIOC203** are required of all Biochemistry specialization students—**Students transferring from another degree specialization with CHEM233 and/or BIOL201 (or BIOC202) should see a specialization adviser.** Students who completed BIOL201 (or BIOC202) and/or CHEM233 (and CHEM235) with a grade of  $\geq 76\%$  **MAY** be able to substitute BIOC203 with BIOL201(or BIOC202) and/or CHEM203 with CHEM233.
- **BIOL234 is required of all Biochemistry specializations.** Students with a grade of  $\geq 70\%$  **MAY** be able to substitute BIOL234 with BIOL233. Students can register into BIOL234 in the winter or the following summer.
- students who complete second year successfully and also take BIOL 200/201, may be qualified for, and eligible to transfer into, a Biochemistry specialization in third year

**Second year students in the biochemistry major or honours specializations do NOT require registration into Standard Timetables (STTs). Registration into a 2<sup>nd</sup> year STT is only required of biochemistry students in a combined major or honour specialization.**

The information below, is **only for 2<sup>nd</sup> year biochemistry students registering into a combined major or honours STT.**

Students must have completed two semesters of first-year chemistry, BIOL 121 (or equivalent), as well as courses in both first-year differential and integral calculus, in order to utilize the STTs. Students in Science One will have met the equivalent prerequisites. The STTs will be available through the SSC by following the Standard Timetables/BSC links. The STTs may also be viewed on the Winter Session [Course Schedule](https://courses.students.ubc.ca/cs/main) (<https://courses.students.ubc.ca/cs/main>).

All of the STTs are “fixed” which means that you must add any missing courses that you require, as well as your electives, to the STT that you have chosen. Departments will not move any component of the STTs to accommodate a potential conflict; you must schedule your other courses in the free space in the timetables. Thus, you should first select an STT and then add your other courses to this framework. Note that the registration system will not allow conflicts in a timetable and thus careful selection of courses is necessary. Biochemistry students will need to add MATH200 and any desired electives to the STT selected, as well as BIOL 112 and/or one of MICB202, 211, 212 if needed (honours specialization). MATH200 may also be taken in the summer semester immediately before or after second year. Note that MATH200 is a prerequisite for CHEM304 and is required for promotion to fourth year.

Students must take **all** components of the chosen STT - the only exception is as follows:

- Students who complete BIOL 200 and/or BIOL 234 and/or CHEM233/235 (with a grade of  $\geq 76\%$ ) during the summer may request that it be dropped from their STT.

**Requests to drop BIOL 200, BIOL 234, or CHEM203 from your STT** should complete the Advising/Registration Inquiry Form at <https://www.chem.ubc.ca/inquiry-form> after your registration opens. **If possible**, you should register into your chosen STT first.

Students who have already completed, or who have transfer credit for, CHEM 223/213/225/245, should be able to register directly into the remaining Chemistry and/or Math courses that they require; registration in an STT should not be necessary. Should you encounter any difficulties accessing needed Chemistry courses, please contact [wwarren@mail.ubc.ca](mailto:wwarren@mail.ubc.ca).

Biochemistry specialization students who:

- still need to take CHEM 203/213/245 but who have third year or higher standing in the Faculty of Science,
- have completed BIOL201 with a grade of  $\geq 76\%$ ,

should contact a biochemistry adviser.

# BIOCHEMISTRY MAJOR

## THIRD AND FOURTH YEAR SPECIALIZATION REQUIREMENTS

### REQUIRED COURSES

#### Third Year:

BIOC301, 303	(9 credits)	<i>[Lab &amp; lecture; both full year. Pre-requisite to BIOC4xx]</i>
BIOC304	(3)	<i>[Research skills theory course. Required for promotion to 4th year.]</i>
BIOL335	(3)	<i>[Genetics. Pre-requisites to BIOC410 - may also be taken in summer.]</i>
Electives	(as needed)	

#### Third or Fourth Years:

CHEM304, 313	(6)	<i>[Biophysical Chemistry &amp; Organic chemistry]</i>
CHEM315, 335	(2)	<i>[Term 1 and 2 third year chemistry labs]</i>

*(Many students defer 3/4 credits of CHEM3xx to 4<sup>th</sup> year to reduce their 3<sup>rd</sup> year course load.)*

#### Fourth Year:

BIOC402, 410	(6)	<i>[Proteins and Nucleic acids]</i>
TWO of BIOC403, 421, 440, 450, 460 or 470	(6)	<i>[Capstone biochemistry elective courses.]</i>
Electives	(as needed)	

**Second year Biochemistry standing DOES NOT guarantee admission into the third year of the specialization. Entry into Bioc 301 is required and this is based on academic record.**

### ELECTIVES

Arts (12): At least 12 credits of electives must be in **Arts** (courses offered for credit in the Faculty of Arts). Any courses taken to fulfill the Communication Requirement **CANNOT** be used to fulfill the Arts Elective.

Breadth (6/3): Students in all biochemistry specializations have automatically fulfilled the biology, mathematics, chemistry, and physics categories of the breadth requirement. Students in biochemistry major or honours specializations need to fulfill two more categories (3 credits each) chosen from statistics, computer sciences, and earth and planetary science. Students in the combined major or combined honours biochemistry/chemistry need to fulfill one more category. Students in the combined honours biochemistry/forensics automatically fulfill the breadth requirement

Upper Level (13): At least 13 credits of electives must be 300/400 level courses (needed to satisfy the Faculty of Science requirement for **48 credits of Upper Level coursework** for the Major degree); they may be in **any** faculty. Note that any courses taken to meet the Arts or Breadth requirements, that are 300/400 level courses, will *also* count towards the Upper Level requirement.

Total Credits: A minimum of 120 eligible credits is normally required to graduate with the B.Sc. Biochemistry Major degree; sufficient electives must be completed to reach this total. Students who have transferred coursework to UBC should confirm with a Biochemistry adviser, and/or with Science Advising, which of their transfer credits will be applicable to their degree specialization & how many UBC credits will be needed.

### CO-OP PROGRAM

The Biochemistry Co-op program is open to both Major and Honours students. It involves 4 consecutive work terms, starting in the summer following completion of third year. Students apply to the Science Co-op Office in September of third year, and are usually notified of acceptance sometime in November. For further information, application forms and guidelines, please visit the Co-op website: <http://www.sciencecoop.ubc.ca/>.

# BIOCHEMISTRY HONOURS SPECIALIZATIONS

## THIRD AND FOURTH YEAR REQUIREMENTS

### REQUIRED COURSES

#### Third Year:

BIOC301, 303, 304	(12 credits)	[Lab & lecture; both full year. Pre-requisite to BIOC4xx.]
BIOL335	(3)	[Genetics. Pre-requisites to BIOC410 - may also be taken in summer.]
CHEM304, 313	(6)	[Normally third year chemistry courses are completed in third year to avoid scheduling conflicts in fourth year]
CHEM315, 335	(2)	
Electives	(as needed)	[See below]

#### Third or Fourth Year:

Honours BIOC Elective	(3)	[See below]
-----------------------	-----	-------------

#### Fourth Year:

BIOC402, 410	(6)	[Proteins and Nucleic acids]
BIOC404, 420	(6)	[Materials and Methodology and honours lab courses]
BIOC449	(6)	[Honours thesis project]
TWO of BIOC 403, 440, 450, 460 or 470	(6)	[Capstone biochemistry elective courses.]
Electives	(as needed)	

**Second year Biochemistry standing DOES NOT guarantee admission into the third year of the specialization. Entry into Bioc 301 is required and this is based on academic record.**

### NOTES

**Honours Specialization Requirements:** Students in Biochemistry Honours specializations must register in a minimum of 30 credits in each Winter Session (except in their final year if less than 30 credits are needed to graduate), and maintain a minimum average with no failures. In the previous academic session, this average was 76%.

**Major students wishing to transfer into third year Honours**, who meet these requirements and have taken the needed second year coursework, should contact the Biochemistry adviser to request transfer to the honours specialization.

**Electives:** Totals of, at minimum, 132 credits are normally required to graduate in the single honours or combined honours specializations. The totals must include at least 12 credits of **Arts** elective and the breadth requirement (see page 3); any remaining electives are unrestricted and may be either inside or outside the field of the degree and at any year level. Any courses taken to fulfill the Communication Requirement **CANNOT** be used to fulfill the Arts Elective.

#### **Single Honours:**

- Honours students wishing to replace BIOC449 with BIOC421 should see their biochemistry adviser. This is not normally permitted.
- Honours BIOC Electives may be taken in either third or fourth years and can be selected from the following:  
3 credits of any CHEM3xx or 4xx                      PCTH325 (3)                      CAPS301 (6)  
One of MICB302, 306, 325, 403 or 405 (3)                      BIOC403, 440, 450, 460, 470

**NOTE: BIOC403, 440, 450, 460 CANNOT be double counted. Students using one of these courses to fulfill their graduation requirements CANNOT use the same course as a honours BIOC elective.**

#### **Combined Honours:**

- Students interested in the Biochemistry and Chemistry combined honours should see the next page.

# COMBINED MAJORS IN BIOCHEMISTRY & CHEMISTRY

## THIRD AND FOURTH YEAR SPECIALIZATION REQUIREMENTS

### REQUIRED COURSES

#### Third Year:

BIOC301, 303	(9 credits)	<i>[Lab &amp; lecture; both full year. Pre-requisite to BIOC4xx]</i>
BIOC304	(3)	<i>[Research skills theory course. Required for promotion to 4th year.]</i>
BIOL335	(3)	<i>[Genetics. Pre-requisites to BIOC410 - may also be taken in summer.]</i>
CHEM304, 313	(6)	<i>[Biophysical Chemistry &amp; Organic chemistry]. CHEM330 may be substituted for CHEM313</i>
CHEM315, 335	(2)	<i>[Term 1 and 2 third year chemistry labs]. May be substituted with CHEM325/345</i>
ONE of CHEM218, 305 311, 312, 327	(3)	<i>Students taking CHEM218 will need to complete another 3 credits of Upper level electives</i>
Electives	(as needed)	

#### Fourth Year:

BIOC402, 410	(6)	<i>[Proteins and Nucleic acids]</i>
ONE of BIOC403, 440, 450, 460, 470	(3)	<i>[Capstone biochemistry elective courses.]</i>
BIOC421 or CHEM445	(3)	<i>With permission from an advisor, may be replaced with BIOC or CHEM 448</i>
CHEM Selections	(6)	<i>Picked from CHEM4XX courses.</i>
Electives	(as needed)	

**Second year Biochemistry standing DOES NOT guarantee admission into the third year of the specialization. Entry into Bioc 301 is required and this is based on academic record.**

### ELECTIVES

Arts (12): At least 12 credits of electives must be in **Arts** (courses offered for credit in the Faculty of Arts). Any courses taken to fulfill the Communication Requirement **CANNOT** be used to fulfill the Arts Elective.

Breadth (3) See page 3

Upper Level (4): At least 4 credits of electives must be 300/400 level courses (needed to satisfy the Faculty of Science requirement for **48 credits of Upper Level coursework** for the Major degree); they may be in **any** faculty. Note that any courses taken to meet the Arts requirement that are 300/400 level courses, will *a/so* count towards the Upper Level requirement.

Total Credits: A minimum of 120 eligible credits is normally required to graduate with the B.Sc. Biochemistry Major degree; sufficient electives must be completed to reach this total. Students who have transferred coursework to UBC should confirm with a Biochemistry adviser, and/or with Science Advising, which of their transfer credits will be applicable to their degree specialization & how many UBC credits will be needed.

Students in the Combined Majors do not need complete the breadth requirement.

### CO-OP PROGRAM

The Biochemistry Co-op program is open to both Major and Honours students. It involves 4 consecutive work terms, starting in the summer following completion of third year. Students apply to the Science Co-op Office in September of third year, and are usually notified of acceptance sometime in November. For further information, application forms and guidelines, please visit the Co-op website: <http://www.sciencecoop.ubc.ca/>.

# COMBINED HONOURS IN BIOCHEMISTRY & CHEMISTRY

## THIRD AND FOURTH YEAR REQUIREMENTS

### REQUIRED COURSES

#### Third Year:

BIOC301, 303, 304	(12 credits)	<i>[Lab &amp; lecture; both full year. Pre-requisite to BIOC4xx]</i>
BIOL335	(3)	<i>[Genetics. Pre-requisites to BIOC410 - may also be taken in summer.]</i>
CHEM304	(3)	<i>[Physical chemistry]</i>
CHEM313	(3)	<i>[Organic chemistry]; May be replaced with CHEM330</i>
CHEM319, 329	(2)	<i>Practical skills for chemistry research and data analysis</i>
ONE of CHEM218, 305 311, 312, 327	(3)	<i>Students taking CHEM218 will need to complete another 3 credits of Upper level electives</i>
Laboratory Requirement	(4 or 5)	<i>EITHER CHEM325/345 or CHEM315/335 AND BIOC420.</i>
Electives	(as needed)	<i>[See below]</i>

#### Fourth Year:

BIOC402, 410	(6)	<i>[Proteins and Nucleic acids]</i>
BIOC404	(3)	<i>[Materials and Methodology course]</i>
BIOC449 or CHEM449	(6)	<i>[Honours thesis project]</i>
ONE of BIOC 403, 440, 450, 460, 470	(3)	<i>[Capstone biochemistry elective courses.]</i>
CHEM Electives	(9)	<i>Choose 6 credits from CHEM4xx lecture courses. The remaining 3</i>
Electives	(as needed)	<i>credits can be from CHEM3xx or 4xx lecture courses.</i>

**Second year Biochemistry standing DOES NOT guarantee admission into the third year of the specialization. Entry into Bioc 301 is required and this is based on academic record.**

### NOTES

**Honours Specialization Requirements:** Students in Honours specializations must register in a minimum of 30 credits in each Winter Session (except in their final year if less than 30 credits are needed to graduate), and maintain a minimum average with no failures. In the previous academic session, this average was 76%.  
**Major students wishing to transfer into third year Honours**, who meet these requirements and have taken the needed second year coursework, should contact the Biochemistry adviser to request transfer to the honours specialization.

**Electives:** Totals of, at minimum, 132 credits are normally required to graduate in the combined honours specializations. The totals must include at least 12 credits of **Arts** elective and the breadth requirement (see page 3); any remaining electives are unrestricted and may be either inside or outside the field of the degree and at any year level. Any courses taken to fulfill the Communication Requirement **CANNOT** be used to fulfill the Arts Elective.