

## B.S. BIOCHEMISTRY DEGREE PROGRAM

### Suggested Course Sequence

- The BS Biochemistry degree program provides excellent preparation for a career in the biotech industry or post-graduate work. It also offers flexibility in upper division elective options, which enables students to better customize their degree program for their intended career path. Students are urged to consult with an advisor regarding their educational and career plans.
- Courses used in the major program must be completed with a minimum grade point average of 2.0. All courses used in the major program must be completed with letter grades (CR/NC not allowed) and courses used for CHEM prerequisites must be completed with a C or better. A grade of C- or better is required in CHEM 341 and CHEM 343.
- Students will be notified by email the semesters they are required to meet with a *Chem/Biochem advisor* before registration.
- Students are urged to check their Degree Progress Report (DPR) to ensure they are meeting General Education requirements. For difficult GE situations students are encouraged to meet with a *General Education (GE) advisor* (Advising Center, ADM 211, 415–338–2103; advising@sfsu.edu).
- Students should refer to the *SFSU Bulletin* (<http://bulletin.sfsu.edu>) for detailed information on *University policies and procedures, GE requirements, requirements for the major, and course descriptions and prerequisites.*

| Freshman Year - Fall Semester |                       | Units |
|-------------------------------|-----------------------|-------|
| CHEM 115                      | General Chemistry I   | 5     |
| PHYS 111 <sup>1</sup>         | General Physics I     | 3     |
| PHYS 112 <sup>1</sup>         | General Physics I Lab | 1     |

| Freshman Year - Spring Semester |                          | Units |
|---------------------------------|--------------------------|-------|
| CHEM 215                        | General Chemistry II     | 3     |
| CHEM 216                        | General Chemistry II Lab | 2     |
| PHYS 121 <sup>1</sup>           | General Physics II       | 3     |
| PHYS 122 <sup>1</sup>           | General Physics II Lab   | 1     |

| Sophomore Year - Fall Semester |                         | Units |
|--------------------------------|-------------------------|-------|
| CHEM 233                       | Organic Chemistry I     | 3     |
| CHEM 234                       | Organic Chemistry I Lab | 2     |
| CHEM 321                       | Quantitative Analysis   | 3     |

| Sophomore Year - Spring Semester |                      | Units |
|----------------------------------|----------------------|-------|
| CHEM 335                         | Organic Chemistry II | 3     |
| BIOL 230                         | Intro Biology I      | 5     |
| MATH 226                         | Calculus I           | 4     |

| Junior Year - Fall Semester |                                    | Units |
|-----------------------------|------------------------------------|-------|
| CHEM 340                    | Biochemistry I                     | 3     |
| CHEM 390GW                  | Contemporary Chem/Biochem Research | 3     |
| MATH 227                    | Calculus II                        | 4     |

| Junior Year - Spring Semester |  | Units |
|-------------------------------|--|-------|
| CHEM 341                      | Biochemistry II                              | 3     |
| CHEM 343                      | Biochemistry I Lab                           | 3     |
|                               | Upper division chemistry or biology elective | 3     |

| Senior Year - Fall Semester |   | Units |
|-----------------------------|---|-------|
| CHEM 300 <sup>2</sup>       | General Physical Chemistry I                  | 3     |
|                             | Upper division chemistry or biology electives | 6     |

| Senior Year - Spring Semester |  | Units |
|-------------------------------|--|-------|
| CHEM 301 <sup>2</sup>         | General Physical Chemistry II                | 3     |
|                               | Upper division chemistry or biology elective | 3     |

#### Upper Division Chemistry and Biology Electives

- Must complete at least 12 units of upper division electives selected from the lists below, including at least one chemistry course and at least three lab courses (indicated below). Courses taken at community colleges cannot be used to meet electives in the major.
- Note that some elective courses are offered only once per year and others less frequently.
- Check course co- and pre-requisites *before* choosing/enrolling in these elective classes.
- May substitute appropriate courses (including graduate) in biology, physics, geosciences, and computer science; prior approval of an advisor is required.

| Chemistry Electives   |   | Units   |
|-----------------------|---|---------|
| CHEM 322              | Quantitative Analysis Lab               | 2 (lab) |
| CHEM 327              | Practical GC and HPLC                   | 4 (lab) |
| CHEM 370              | Computer Applications in Chem & Biochem | 3 (lab) |
| CHEM 336              | Organic Chemistry II Lab                | 2 (lab) |
| CHEM 420              | Environmental Analysis                  | 3 (lab) |
| CHEM 422              | Instrumental Analysis                   | 4 (lab) |
| CHEM 325 <sup>5</sup> | Inorganic Chemistry                     | 3       |
| CHEM 426              | Inorganic Chemistry Lab                 | 2 (lab) |
| CHEM 433              | Advanced Organic Chemistry              | 3       |
| CHEM 443              | Biophysical Chemistry Lab               | 4 (lab) |
| CHEM 451              | Experimental Physical Chemistry         | 2 (lab) |
| CHEM 470              | Research                                | 3 (lab) |
| CHEM 640              | Special Topics in Biochemistry          | 2-3     |
| CHEM 645              | Research Trends in Chem/Biochem         | 3       |
| CHEM 680              | Chemical Oceanography                   | 3       |
| CHEM 699 <sup>3</sup> | Independent Study                       | 3 (lab) |

| Biology Electives <sup>4</sup> |                                   | Units   |
|--------------------------------|-----------------------------------|---------|
| BIOL 350                       | Cell Biology                      | 3       |
| BIOL 351GW                     | Expts in Cell & Molecular Biology | 4 (lab) |
| BIOL 355                       | Genetics                          | 3       |
| BIOL 357                       | Molecular Genetics                | 3       |
| BIOL 358                       | Forensic Genetics                 | 4 (lab) |
| BIOL 361                       | Human Genetics                    | 3       |
| BIOL 401                       | General Microbiology              | 3       |
| BIOL 402GW                     | General Microbiology Lab          | 3 (lab) |
| BIOL 420                       | General Virology                  | 3       |
| BIOL 435                       | Immunology                        | 3       |
| BIOL 436                       | Immunology Lab                    | 2 (lab) |
| BIOL 612                       | Human Physiology                  | 3       |
| BIOL 613GW                     | Human Physiology Lab              | 4 (lab) |
| BIOL 638                       | Bioinformatics & Gene Annotation  | 4       |
| BIOL 640                       | Cellular Neurosciences            | 3       |

<sup>1</sup> PHYS 220/222 and either 230/232 or 240/242 may be substituted for PHYS 111/112 and 121/122.

<sup>2</sup> CHEM 351 and 353 may be substituted for CHEM 300 and 301 upon advisement.

<sup>3</sup> CHEM 699 requires add permit from research advisor, must be 3 units, and requires a written report and a public poster presentation.

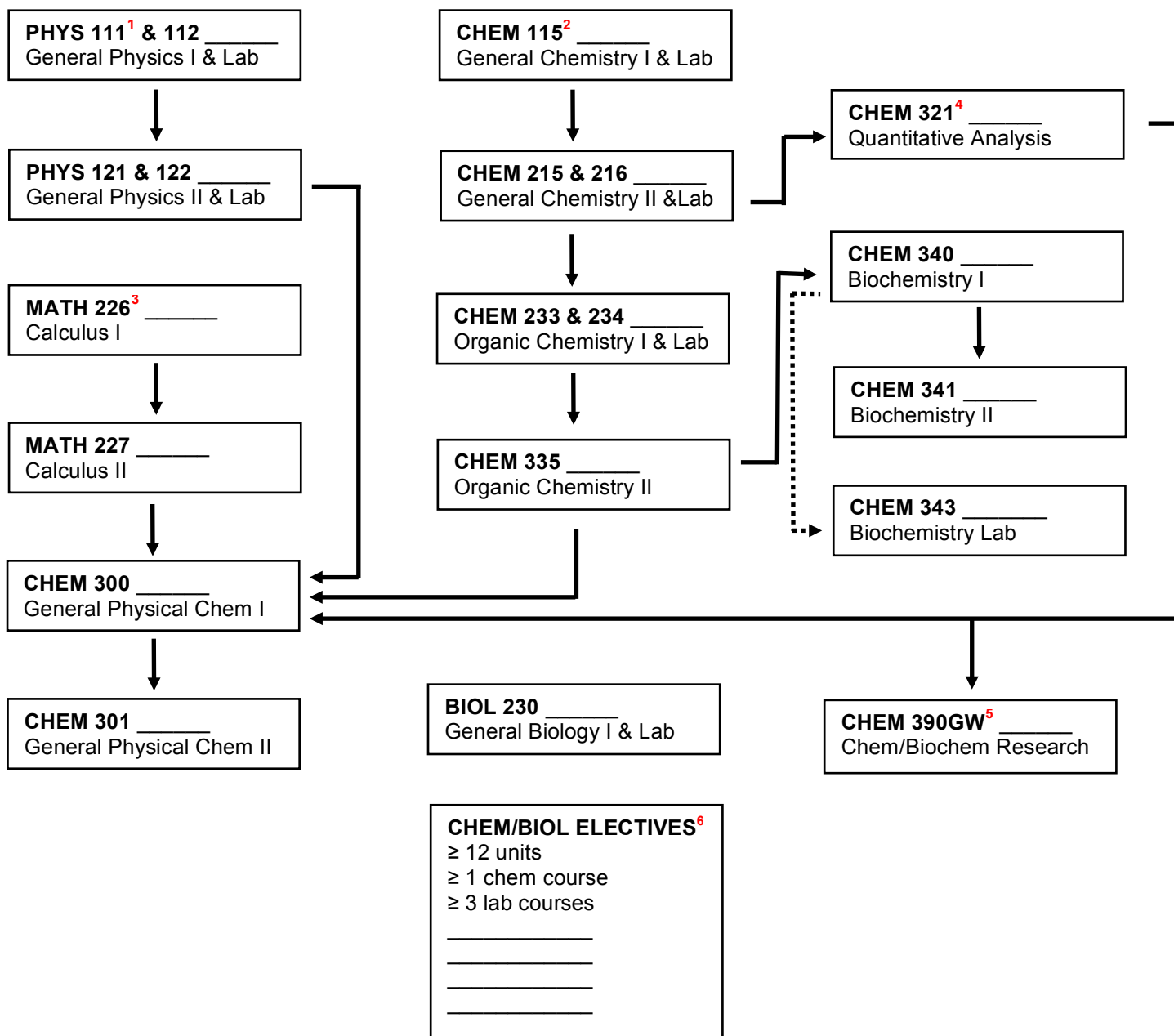
<sup>4</sup> BIOL 230 and BIO 240 are prerequisites for the biology electives listed here. Biochemistry majors may take BIOL 350, 355, or 612 without BIOL 240 if they have completed BIOL 230 and CHEM 340 with grades of C or better.

<sup>5</sup> CHEM 325 cannot be double counted towards a BS Biochemistry degree for students double majoring with a BA Chemistry degree.

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## Flowchart for Degree Program

- Students should consult course descriptions in the current SFSU Bulletin to confirm prerequisite course(s) and minimum grade requirements prior to registering for the course.
- Solid arrows indicate prerequisite courses (courses that must be completed before enrolling).
- Dashed arrows indicate co-requisite courses (courses that must be completed before enrolling or at same time).
- Use this sheet to track progress towards graduation.



<sup>1</sup> PHYS 111 requires either a C- or better in MATH 199 or completion of an online mini-course.

<sup>2</sup> CHEM 115 requires C or better grade in CHEM 100 or satisfactory score on chemistry placement exam (see Department website for details: chemistry.sfsu.edu), and 50 or above on ELM or C or better in MATH/ESM 70.

<sup>3</sup> MATH 226 requires acceptable score on calculus readiness test and either C or better in MATH 199 or B or better in pre-calculus class.

<sup>4</sup> Although the corresponding lab class (CHEM 322) is not required for the B.S. Biochemistry degree, it is a prerequisite for some upper division chemistry elective classes (i.e., CHEM 327, 420, 422, 426, 451).

<sup>5</sup> CHEM 390 requires *either* CHEM 321 or CHEM 335 as a prerequisite.

<sup>6</sup> Most CHEM electives require CHEM 335 and/or CHEM 321/322 as a prerequisite. All BIOL electives require BIOL 230 and many have other prerequisites. Check with the Bulletin and your advisor for more information.