

The following is a sample schedule to help students plan their coursework. These are suggestions and the schedule is flexible. In addition to fulfilling the courses specifically required for this degree, it is important that students also fulfill Dragon Core requirements and normal graduation requirements (at least 120 total credits, at least 40 upper/division credits [300/400 level], and a GPA of at least 2.0.)

| FALL | | | | FRESHMAN YEAR | | | | DC | |
|------|-----|----------------------------------|---|---|----|--|--|----|--|
| | | | | Dragon Core (1A or 2) or Bioscience Elective ⁴ | 4 | | | | |
| CHEM | 150 | Gen Chem I (lab) | 4 | 4L | | | | | |
| ENGL | 101 | English Composition ¹ | 3 | 1B | | | | | |
| MATH | 142 | Precalculus ² | 4 | 3 | | | | | |
| HLTH | 122 | Personal Health/Wellness | 1 | | | | | | |
| | | | | Total Credits | 16 | | | | |

| SPRING | | | | DC | |
|--------|-----|--|---|---------------|----|
| BIOL | 111 | Cell Biology (lab) | 4 | | |
| CHEM | 210 | Gen Chem II (lab) | 4 | | |
| | | Dragon Core (1A or 2) ¹ | 3 | Y | |
| | | Dragon Core (1A or 2) | 3 | 2 | |
| | | Dragon Core (3, 5, 6, or 7) ³ | 3 | Y | |
| | | | | Total Credits | 17 |

| FALL | | | | SOPHOMORE YEAR | | | |
|------|-----|-------------------------|---|----------------|----|--|--|
| BIOL | 341 | Genetics (lab) | 4 | | | | |
| CHEM | 350 | Organic Chem I | 3 | | | | |
| CHEM | 355 | Organic Chem Lab I | 1 | | | | |
| MATH | 261 | Calculus I ² | 4 | 3 | | | |
| PHYS | 200 | Physics I (lab) | 4 | 4L | | | |
| | | | | Total Credits | 16 | | |

| SPRING | | | | | |
|--------|-----|-------------------------|---|---------------|----|
| BIOL | 385 | Molecular Biology (lab) | 4 | | |
| CHEM | 360 | Organic Chem II | 3 | | |
| CHEM | 365 | Organic Chem Lab II | 1 | | |
| MATH | 262 | Calculus II | 4 | | |
| PHYS | 201 | Physics II (lab) | 4 | | |
| | | | | Total Credits | 16 |

| FALL | | | | JUNIOR YEAR | | | |
|------|-----|---|---|---------------|----|--|--|
| CHEM | 300 | Inorganic Chemistry | 3 | | | | |
| CHEM | 400 | Biochemistry I | 3 | | | | |
| CHEM | 405 | Biochemistry I Lab | 1 | | | | |
| CHEM | 450 | Physical Chemistry I | 3 | | | | |
| CHEM | 455 | Physical Chem Lab I | 1 | | | | |
| | | Dragon Core (3, 5, 6, or 7) or Bioscience Elective ⁴ | 3 | Y | | | |
| | | | | Total Credits | 14 | | |

| SPRING | | | | | |
|--------|-----|---|---|---------------|----|
| CHEM | 380 | Analytical Chemistry | 4 | | |
| CHEM | 410 | Biochemistry II | 3 | | |
| CHEM | 415 | Biochemistry II Lab | 1 | | |
| CHEM | 460 | Physical Chem II ⁵ | 3 | | |
| CHEM | 465 | Phys Chem Lab II ⁵ | 1 | | |
| | | Dragon Core (3, 5, 6, or 7) or Bioscience Elective ⁴ | 3 | Y | |
| | | | | Total Credits | 15 |

| FALL | | | | SENIOR YEAR | | | |
|------|-----|---|---|---------------|----|--|--|
| BCBT | 475 | Biotechniques I | 2 | | | | |
| BCBT | | Biotechniques Block | 2 | | | | |
| BCBT | | Biotechniques Block | 2 | | | | |
| | | Dragon Core (3, 5, 6, or 7) or Bioscience Elective ⁴ | 3 | Y | | | |
| | | Dragon Core (8, 9, or 10) | 3 | Y | | | |
| | | | | Total Credits | 12 | | |

| SPRING | | | | | |
|--------|-----|---|---|---------------|----|
| BCBT | 476 | Biotechniques II | 2 | | |
| BCBT | | Biotechniques Block | 2 | | |
| | | Dragon Core (8, 9, or 10) | 3 | Y | |
| | | Dragon Core (3, 5, 6, or 7) or Bioscience Elective ⁴ | 3 | Y | |
| | | Dragon Core (8, 9, or 10) | 3 | Y | |
| | | | | Total Credits | 13 |

¹ These are standard Dragon Core courses, but others can be taken in their place.

² ACS math scores or a mathematics placement exam is needed to inform whether a student should begin directly in calculus, precalculus or a different math class. Math 142 can only be taken by students with an ACT Math Sub Score of 24 or above.

³ English Composition II (ENGL 201) is strongly recommended.

⁴ At least one of the Bioscience electives must be a Physiology course (BIOL 347, 349, or 360). For the other electives, see http://www.mnstate.edu/biotech/BCBT_Advising_Guide.pdf

⁵ Molecular and Biophysical Chemistry (BCBT 450) can be taken (Fall) instead of Physical Chemistry II (Chem 460/465). Physical Chemistry 460/465 is normally offered every other year, in the spring of even-numbered years.



B.S. Degree in Biochemistry and Biotechnology Emphasis in Biological Chemistry

Curriculum Planning

| Dragon Core Checksheet | | | |
|---|---|----------|------------|
| Foundation Four | | | |
| | | Grade | Credits W? |
| 1A | Oral Communication | _____ | _____ |
| 1B | Written Communication (W) English 102 | _____ | 3 X |
| 2 | Critical Thinking | _____ | _____ |
| 3 | Mathematics/Symbolic MATH 102 or 142 | _____ | 3/4 |
| Inner Cluster Electives & Middle Cluster – Competency Areas 3-7, seven courses total | | | |
| | | Grade | Credits W? |
| 3 | Mathematical/Symbolic Systems (optional) | _____ | _____ |
| 3I or 3M | Calculus I | _____ | 4 |
| 4 | Natural Sciences (One Lab Class Required) | _____ | _____ |
| 4I or 4M | CHEM 150 & Lab | _____ | 4 |
| 4I or 4M | Physics (160 or 20) | _____ | 4 |
| 5 | History and the Social Sciences | _____ | _____ |
| 5I or 5M | | _____ | _____ |
| 5I or 5M | | _____ | _____ |
| 6 | Humanities | _____ | _____ |
| 6I or 6M | | _____ | _____ |
| 6I or 6M | | _____ | _____ |
| 7 | Human Diversity | _____ | _____ |
| 7I or 7M | | _____ | _____ |
| 7I or 7M | | _____ | _____ |
| Outer Cluster – Competency Areas 8-10, three courses total | | | |
| | | Grade | Credits W? |
| 8 | Global Perspective | _____ | _____ |
| 9 | Ethical and Civic Responsibility | _____ | _____ |
| 10 | People and the Environment | _____ | _____ |
| Total Dragon Core Credits: | | | |
| (Minimum 14 courses and 42 credits) | | | |
| Writing Intensive Requirements | | | |
| W 1 (1B) | | ENGL 102 | _____ |
| W 2 (MC or OC) | | BIOL 341 | _____ |
| W 3 (MC or OC, 300-400 level) | | BIOL 405 | _____ |
| W 4 (Major, 300-400 level) | | BCBT 475 | _____ |
| W 5 (any W 200-400 level, MC/OC) | | _____ | _____ |

| | | When Offered | Credits | Grade |
|-----------------------------|--|--------------|---------|-------|
| Requirements | | | | |
| BIOL 111 | Cell Biology | S | 4 | |
| BIOL 341 | Genetics | F | 4 | |
| BIOL 385 | Molecular Biology | S | 3 | |
| BIOL 385L | Molecular Lab | S | 1 | |
| CHEM 150 | General Chemistry I | F/Sp/Sum | 4 | |
| CHEM 210 | General Chemistry II | F/Sum | 4 | |
| CHEM 300 | Inorganic Chem | F | 3 | |
| CHEM 350 | Organic Chem I | F | 3 | |
| CHEM 355 | Organic Chem Lab I | F | 1 | |
| CHEM 360 | Organic Chem II | Sp | 3 | |
| CHEM 365 | Organic Chem Lab II | Sp | 4 | |
| CHEM 380 | Analytical Chem | Sp | 4 | |
| CHEM 400 | Biochemistry I | F | 3 | |
| CHEM 405 | Biochemistry Lab I | F | 1 | |
| CHEM 410 | Biochemistry II | Sp | 3 | |
| CHEM 415 | Biochemistry Lab II | Sp | 1 | |
| CHEM 450 | Physical Chem I | F | 3 | |
| CHEM 455 | Physical Chem Lab I | F | 1 | |
| BCBT 475 | Biotechnology I | Sp | 2 | |
| BCBT 476 | Biotechnology II | F | 2 | |
| MATH 261 | Calculus I | F/Sp | 4 | |
| MATH 262 | Calculus II | F/Sp | 4 | |
| PHYS 200 | General Physics I | F | 4 | |
| PHYS 201 | General Physics II | S | 4 | |
| Restricted Electives | | | | |
| BIOL | One Physiology Elective (349, 347, or 360) | | 4 | |
| BCBT | Three Biotechnology Blocks from 477-483 | | 3 x 2 | |
| BIOL ≥300 | One Bioscience Electives from: 115, 323, 305, 321, 345, 347, 348, 349, 350, 360, 365, 372, 402, 430 | | 3-4 | |
| | Physical Chemistry II (CHEM 460) or Molecular and Biophysical Chemistry (BCBT 450) | | 3 | |

The following is a sample schedule to help students plan their coursework. These are suggestions and the schedule is flexible. In addition to fulfilling the courses specifically required for this degree, it is important that students also fulfill Dragon Core requirements and normal graduation requirements (at least 120 total credits, at least 40 upper/division credits [300/400 level], and a GPA of at least 2.0.)

| FALL | | | | FRESHMAN YEAR | | DC |
|---------------|-----|----------------------------------|----|---------------|----|----|
| BIOL | 115 | Organismal Biology (lab) | 4 | | | |
| CHEM | 150 | Gen Chem I (lab) | 4 | 4L | | |
| ENGL | 101 | English Composition ¹ | 3 | | 1B | |
| MATH | 142 | Precalculus ² | 4 | 3 | | |
| HLTH | 122 | Personal Health/Wellness | 1 | | | |
| Total Credits | | | 16 | | | |

| SPRING | | | | | | DC |
|---------------|-----|-----------------------------------|----|---|----|----|
| BIOL | 111 | Cell Biology (lab) | 4 | | | |
| CHEM | 210 | Gen Chem II (lab) | 4 | | | |
| CMST | 100 | Speech Communication ¹ | 3 | | 1A | |
| | | | 3 | 2 | | |
| | | | 3 | Y | | |
| Total Credits | | | 17 | | | |

| FALL | | | | SOPHOMORE YEAR | | |
|---------------|-----|------------------------------|----|----------------|--|--|
| BIOL | 341 | Genetics (lab) | 4 | | | |
| CHEM | 350 | Organic Chem I | 3 | | | |
| CHEM | 355 | Organic Chem Lab I | 1 | | | |
| MATH | 261 | Calculus I ² | 4 | 3 | | |
| PHYS | 200 | Physics I ⁵ (lab) | 4 | 4L | | |
| Total Credits | | | 16 | | | |

| SPRING | | | | | | |
|---------------|------|-------------------------------|-----|--|--|--|
| BIOL | 385 | Molecular Biology (lab) | 4 | | | |
| CHEM | 360 | Organic Chem II | 3 | | | |
| CHEM | 365 | Organic Chem Lab II | 1 | | | |
| MATH | 244/ | Applied Biostatistics | 4 | | | |
| | | | 262 | | | |
| PHYS | 201 | Physics II ⁵ (lab) | 4 | | | |
| Total Credits | | | 16 | | | |

| FALL | | | | JUNIOR YEAR | | |
|---------------|-----|-------------------------------------|-----|-------------|--|--|
| BIOL | | Elective in Bioscience ⁶ | 3/4 | | | |
| BIOL | | Elective in Bioscience ⁶ | 3/4 | | | |
| CHEM | 400 | Biochemistry I | 3 | | | |
| CHEM | 405 | Biochemistry I Lab | 1 | | | |
| | | | 3 | Y | | |
| | | | 3 | Y | | |
| Total Credits | | | ≥16 | | | |

| SPRING | | | | | | |
|---------------|-----|-------------------------------------|-----|---|--|--|
| BIOL | | Elective in Bioscience ⁶ | 3/4 | | | |
| CHEM | 410 | Biochemistry II | 3 | | | |
| CHEM | 415 | Biochemistry II Lab | 1 | | | |
| CHEM | 380 | Analytical Chemistry | 4 | | | |
| | | | 3 | Y | | |
| Total Credits | | | ≥14 | | | |

| FALL | | | | SENIOR YEAR | | |
|---------------|-----|-------------------------------------|-----|-------------|--|--|
| BCBT | 475 | Biotechniques I | 2 | | | |
| BCBT | | Biotechniques Block | 2 | | | |
| BCBT | | Biotechniques Block | 2 | | | |
| BCBT | 450 | Mol & Biophys Chemistry | 3 | | | |
| BIOL | | Elective in Bioscience ⁶ | 3/4 | | | |
| | | | 3 | Y | | |
| Total Credits | | | ≥15 | | | |

| SPRING | | | | | | |
|---------------|-----|-------------------------------------|-----|---|--|--|
| BCBT | 476 | Biotechniques II | 2 | | | |
| BCBT | | Biotechniques Block | 2 | | | |
| BIOL | | Elective in Bioscience ⁶ | 3/4 | | | |
| | | | 3 | T | | |
| | | | 3 | Y | | |
| | | | 3 | | | |
| Total Credits | | | ≥13 | | | |

¹These are standard Dragon Core courses, but others can be taken in their place.

²ACS math scores or a mathematics placement exam is needed to inform whether a student should begin directly in calculus, precalculus or a different math class. Math 142 can only be taken by students with an ACT Math Sub Score of 24 or above.

³Math 244, Applied Biostatistics, satisfies the statistics requirement for Dragon Core, Calculus II does not. However, only two math courses can be used toward Dragon Core (even if MATH 142, 261, and either 262 or 244 are all taken).

⁴English Composition II (ENGL 201) is strongly recommended.

⁵Physics 160/161 can be taken instead of Physics 200/201. Physics 200/201 is calculus-based.

⁶At least one of the Bioscience electives must be a Physiology course (BIOL 347, 349, or 360).

B.S. Degree in Biochemistry and Biotechnology

Emphasis in Cellular and Molecular Sciences

Curriculum Planning

| Dragon Core Checksheet | | | |
|---|---|----------|------------|
| Foundation Four | | | |
| | | Grade | Credits W? |
| 1A | Oral Communication | _____ | |
| 1B | Written Communication (W) English 102 | _____ | 3 X |
| 2 | Critical Thinking | _____ | |
| 3 | Mathematics/Symbolic MATH 102 or 142 | _____ | 3/4 |
| Inner Cluster Electives & Middle Cluster – Competency Areas 3-7, seven courses total | | | |
| | | Grade | Credits W? |
| 3 | Mathematical/Symbolic Systems (optional) | | |
| 3I or 3M | Calculus I | _____ | 4 |
| 4 | Natural Sciences (One Lab Class Required) | | |
| 4I or 4M | CHEM 150 & Lab | _____ | 4 |
| 4I or 4M | Physics (160 or 20) | _____ | 4 |
| 5 | History and the Social Sciences | | |
| 5I or 5M | | _____ | |
| 5I or 5M | | _____ | |
| 6 | Humanities | | |
| 6I or 6M | | _____ | |
| 6I or 6M | | _____ | |
| 7 | Human Diversity | | |
| 7I or 7M | | _____ | |
| 7I or 7M | | _____ | |
| Outer Cluster – Competency Areas 8-10, three courses total | | | |
| | | Grade | Credits W? |
| 8 | Global Perspective | _____ | |
| 9 | Ethical and Civic Responsibility | _____ | |
| 10 | People and the Environment | _____ | |
| Total Dragon Core Credits: (Minimum 14 courses and 42 credits) | | | |
| Writing Intensive Requirements | | | |
| W 1 (1B) | | ENGL 102 | _____ |
| W 2 (MC or OC) | | BIOL 341 | _____ |
| W 3 (MC or OC, 300-400 level) | | BIOL 405 | _____ |
| W 4 (Major, 300-400 level) | | BCBT 475 | _____ |
| W 5 (any W 200-400 level, MC/OC) | | _____ | _____ |

| | | When Offered | Credits | Grade |
|-----------------------------|---|--------------|---------|-------|
| Requirements | | | | |
| BIOL 111 | Cell Biology | S | 4 | |
| BIOL 115 | Organismal Biology | F | 4 | |
| BIOL 341 | Genetics | F | 4 | |
| BIOL 385 | Molecular Biology | S | 3 | |
| BIOL 385L | Molecular Lab | S | 1 | |
| BIOL 450 | Mol. & Biophysical | F | 4 | |
| CHEM 150/150L | General Chemistry I | F/Sp/Sum | 4 | |
| CHEM 210/210L | General Chemistry II | F/Sum | 4 | |
| CHEM 350 | Organic Chem I | F | 3 | |
| CHEM 355 | Organic Chem Lab I | F | 1 | |
| CHEM 360 | Organic Chem II | Sp | 3 | |
| CHEM 365 | Organic Chem Lab II | Sp | 4 | |
| CHEM 380 | Analytical Chem | Sp | 4 | |
| CHEM 400 | Biochemistry I | F | 3 | |
| CHEM 405 | Biochemistry Lab I | F | 1 | |
| CHEM 410 | Biochemistry II | Sp | 3 | |
| CHEM 415 | Biochemistry Lab II | Sp | 1 | |
| BCBT 475 | Biotechnology I | Sp | 2 | |
| BCBT 476 | Biotechnology II | F | 2 | |
| MATH 261 | Calculus I | F/Sp | 4 | |
| Restricted Electives | | | | |
| BIOL | One Physiology Elective from: 349, 347, or 360 | | 4 | |
| BCBT | Three Biotechnology Blocks from 477-483 | | 3 x 2 | |
| BIOL ≥300 | Three Bioscience Electives from: 323, 305, 321, 345, 347, 348, 349, 350, 360, 365, 372, 402, 430, 455 | | ≥9 | |
| MATH | Calculus II (262) or Biostatistics (244) | | 4 | |
| PHYS | General Physics (160/161) or College Physics (200/201) | | 8 | |