

# 2020-2021 Biomolecular Engineering and Bioinformatics: Biomolecular

<p><b>Mathematics</b></p> <p>•MATH 3 or math placement of 400 or higher <b>MATH 19A</b> Calculus I [F/W/Sp/Su]</p> <p>•MATH 19A <b>MATH 19B</b> Calculus II [F/W/Sp/Su]</p> <p>•MATH 3 or math placement of 400 or higher <b>AM 10</b> Mathematical Methods of Engineers I [F/W/Sp]</p> <p>•MATH 19B and AM 10 <b>AM 20</b> Mathematical Methods of Engineers II [W/Sp]</p> <p>•MATH 19B <b>STAT 131</b> Intro to Probability Theory [F/W/Sp/Su]</p> <p>•STAT 131 <b>STAT 132</b> Classical and Bayesian Inference [W/Sp]</p> <p>OR</p> <p>•STAT 131 <b>STAT 206</b> Applied Bayesian Statistics [W]</p>	<p><b>Chemistry &amp; Biochemistry</b></p> <p>•MATH 3 or math placement of 300 or higher <b>CHEM 1A</b> General Chemistry [F/W/Sp/Su]</p> <p><b>CHEM 1B/M</b> General Chemistry/Lab [F/W/Sp/Su]</p> <p>•CHEM 1A <b>CHEM 1C/N</b> General Chemistry/Lab [F/W/Sp/Su]</p> <p>•CHEM 1B and 1C <b>CHEM 8A</b> Organic Chemistry [F/W/Su]</p> <p>•CHEM 8A <b>CHEM 8B</b> Organic Chemistry [W/Sp/Su]</p> <p>•CHEM 8B and BIOL 20A <b>BIOC 100A</b> Biochemistry and Molecular Biology [F]</p> <p>•BIOC 100A <b>BIOC 100B</b> Biochemistry and Molecular Biology [W]</p>	<p><b>Laboratory Courses: Choose one Sequence</b></p> <p><b>(Strongly Recommended)</b> <b>BME 21L</b> Intro. To Basic Laboratory Techniques [Sp]</p> <p>&amp;</p> <p>•BME 21L and Chem 1B/M <b>(Strongly Recommended)</b> <b>BME 22L &amp; BME 23L</b> Foundations of Design and Experimentation in Molecular Biology I &amp; II <b>BME 22L</b> [F] <b>BME 23L</b> [W]</p> <p>•BIOL 20A and previous or concurrent enrollment in BIOE 20B <b>BIOL 20L</b> Experimental Biology Laboratory [F/W/Sp/Su]</p> <p>&amp;</p> <p>•CHEM 8L: CHEM 1C/N and previous or concurrent enrollment in CHEM 8A •CHEM 8M: CHEM 8A/L and previous or concurrent enrollment in CHEM 8B <b>CHEM 8L &amp; CHEM 8M</b> Organic Chemistry Laboratory <b>CHEM 8L</b> [F/W/Su] <b>CHEM 8M</b> [W/Sp/Su]</p>	<p><b>Biology &amp; Physics</b></p> <p>•CHEM 1A <b>BIOL 20A</b> Cell and Molecular Biology [F/W/Sp/Su]</p> <p>•MATH 19A <b>PHYS 5A/L*</b> Introduction to Physics I [F/W]</p> <p>•PHYS 5A/L, corequisite of MATH 19B <b>PHYS 5B/M*</b> Introduction to Physics II [Sp]</p>	<p><b>Humanities</b></p> <p><b>BME 80G</b> Bioethics in the 21<sup>st</sup> Century: Science, Business, and Society [F]</p> <p>•ELWR and BIOL 20A <b>(Strongly Recommended)</b> <b>BME 185</b> Technical Writing for Biomolecular Engineers [F]</p> <p>OR</p> <p>•ELWR and CSE 12 or CSE 15 or CSE 30 or BME 160 <b>CSE 185E</b> Technical Writing for Computer Engineers [F/W/Sp]</p>	<p><b>Genetics &amp; Bioinformatics</b></p> <p>•BIOL 20A <b>BME 105</b> <b>(Strongly Recommended)</b> Genetics in the Genomics Era [Sp]</p> <p>OR</p> <p>•BIOL 20A and BIOE 20B <b>BIOL 105</b> Genetics [F/W/Sp/Su]</p> <p>•BME 105 or BIOL 105 or BIOC 100A or declared BMEB majors <b>BME 110</b> Computational Biology Tools [W/Sp]</p> <p>•BIOL 20A <b>BME 160 (6 units)<sup>Ω</sup></b> Research Programming in the Life Sciences [W/Sp]</p> <p>•BME 160 or BME 205 <b>BME 163 (3 units)</b> Applied Visualization and Analysis of Scientific Data [Sp]</p>
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**Modeling & Design Sequence**  
Choose one of the following sequences

<p>•BIOL 20A and BIOC 100A <b>BME 128</b> Protein Engineering [W]</p> <p>&amp;</p> <p>•BME 128 and BIOL 20L or BME 21L <b>BME 128L (2 units)</b> Protein Engineering Lab. [Sp]</p>	<p>•BIOL 20A <b>BME 177</b> Engineering Stem Cells [Sp]</p> <p>&amp;</p> <p>•BME 128 and BIOL 20L or BME 21L <b>BME 128L (2 units)</b> Protein Engineering Lab. [Sp]</p>	<p>•STAT 131 and AM 20 <b>AM 115</b> Stochastic Modeling in Biology [Sp]</p>
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**Elective: Course used as an Elective cannot be used to satisfy other major requirements**

BIOL 115\*, METX 119, BIOC 100C, BME 122H, BME 128, BME 128L, BME 130, BME 132, BME 140, BME 175, BME 177, BME 178, ECE 104, or any 5-credit biomolecular engineering graduate course

**Exit Requirements**  
Requirements must be completed by the end of a student's final quarter.

- Portfolio
- Exit Survey
- Exit Interview

**Biomolecular Capstone: Students must complete one of the following:**

Bioinformatics Capstone <sup>#</sup>	iGEM	Senior Design	Senior Thesis <sup>α</sup>
<p>•BME 160, STAT 131, and prev. or conc. Enrollment in BIOC 100A <b>BME 205</b> Bioinformatics Models and Algorithms [F]</p> <p>•BME 205 <b>BME 230A</b> Introduction to Computational Genomics and Systems Biology [W]</p>	<p>•prev or conc. Enrollment in BME 185 or CSE 185E <b>BME 180(2 units)</b> Professional Practice in Bioengineering [W]</p> <p>•BME 180 and prev or conc. Enrollment in BME 185 or CSE 185E <b>BME 188A(2 units)</b> Synthetic Biology – Mentored Research A [Sp]</p> <p>•BME 188A <b>BME 188B</b> Synthetic Biology – Mentored Research B [Su]</p> <p>•BME 188B <b>BME 188C</b> Synthetic Biology – Mentored Research C [Su]</p>	<p>•BIOL 20A and BIOC 100A <b>BME 129A</b> Biomolecular Engineering Project I [F]</p> <p>•BME 129A <b>BME 129B</b> Biomolecular Engineering Project II [W]</p> <p>•BME 129A and BME 129B <b>BME 129C</b> Biomolecular Engineering Project III [Sp]</p>	<p><b>BME 195 (5 units)</b> Senior Thesis Research [F]</p> <p><b>BME 195F (2 units)</b> Senior Thesis Research [W]</p> <p>•BME 185 or CSE 185E, conc. Enrollment in BME 195F <b>BME 123T (5 units)</b> Senior Thesis Writing [W]</p> <p><b>BME 195 (5 units)</b> Senior Thesis Research [Sp]</p>

# 2020-2021 Biomolecular Engineering and Bioinformatics: Biomolecular

Fall _____	Winter _____	Spring	Summer _____

Fall _____	Winter _____	Spring	Summer _____

Fall _____	Winter _____	Spring	Summer _____

Fall _____	Winter _____	Spring	Summer _____

### Legend

Ω Students with no prior programming experience are advised to take CSE 20 prior to BME 160

# The Bioinformatics capstone is programming heavy. Students interested in this capstone are advised to take additional programming classes.

α The thesis option consists of 12 credits of Independent Study (BME 198), Field Study (BME 193), or Senior Thesis Research (BME 195) in Biomolecular Engineering; and BME 123T Senior Thesis Writing (5 units). Students pursuing the senior thesis option must write a two-page thesis proposal and seek approval of their project from the undergraduate director in the quarter preceding the independent study courses, typically spring quarter of the third year. Students spend three or more quarters working on their thesis projects. These students must enroll in BME 123T, Senior Thesis Writing, before completing their thesis.

◆ Students following the 2020-2021 curriculum may use Phys 6A/L and Phys 6B/M in place of Phys 5A/L and Phys 5B/M. The Physics 5 series is strongly recommended.

Student Name:

Adviser Name/Notes: