

# Proposed Changes in Bioinformatics and Molecular Biology curriculum, 2014.

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# Motivation

- CHEM 4330/4340 Drug Discovery+ Lab will not be offered next year.
- BFMB currently has only 2 Computer Science courses, but jobs in bioinformatics are heavy on computation.
- BFMB needs to be more flexible, less cookie-cutter.

# Summary of changes

- CHEM 4330/4340 DD removed from the template.
- BIOL 4770 Molec Biochem 2 removed from template, added to the Depth Elective.
- “Math elective” eliminated, replaced by Depth.
- “Depth Elective” added. Choose three from two lists, at least one from each list, Experimental and Computational.
- BIOL 4550 MM moved to junior year.
- CE changes.

8 credits moved from specific courses to required electives.

## Common core courses for BIOL, BCBP, BFMB

**BIOL** 1010 2120 4620 4760

**CHEM** 1100 1200 2230/2250 2240/2260

**PHYS** 1100 1200

**MATH** 1010 1020

48 core +  
24 HASS = 72 credits

	Major specific courses	Electives	req+req elec +free elec
<b>BIOL</b>	BIOL 2500 + 4 biol electives + adv lab + CE <sup>‡</sup>	7	4+20+28
<b>BCBP*</b>	BIOL 2500, 4770, 4200, CHEM 2440 + 2 bcbp electives + ??? + CE <sup>‡</sup>	3?	16+??+12
<b>BFMB</b>	BIOL 4770, 4540, 4550 <sup>‡</sup> , 4630, 4720, CHEM 4330/4340, CSCI 1100, 1200 + + math 3 depth electives + CE <sup>‡</sup>	4	24+12+16

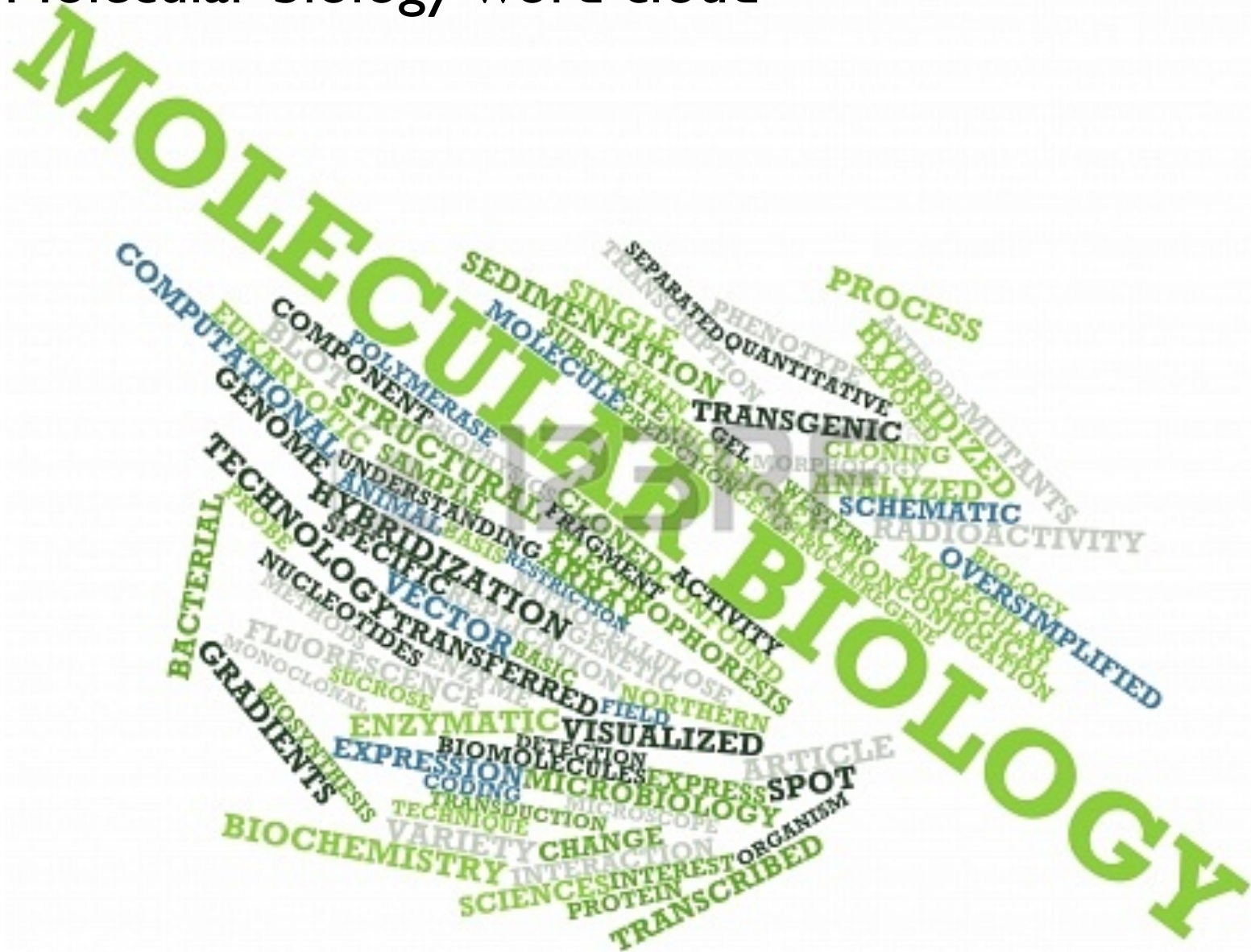
\*BCBP revised Jan 2014

<sup>‡</sup> Culminating experience





# Molecular biology word cloud



# BFMB TEMPLATE CHANGE

## First Year, Fall term

- **CURRENT TEMPLATE**
- HASS Elective *Credit Hours: 4*
- BIOL 1010 - Introduction to Biology *Credit Hours: 4*
- CHEM 1100 - Chemistry I *Credit Hours: 4*
- MATH 1010 - Calculus I *Credit Hours: 4*

## First Year, Spring term

- **CURRENT TEMPLATE**
- HASS Elective *Credit Hours: 4*
- BIOL 2120 - Introduction to Cell and Molecular Biology *Credit Hours: 4*
- CHEM 1200 - Chemistry II *Credit Hours: 4*
- MATH 1020 - Calculus II *Credit Hours: 4*

## First Year, Fall term

- **PROPOSED TEMPLATE**
- no change

## First Year, Spring term

- **PROPOSED TEMPLATE**
- no change



# BFMB TEMPLATE CHANGE

## Second Year, Fall term

### • CURRENT TEMPLATE

- HASS Elective *Credit Hours: 4*
- CHEM 2230 - Organic Chemistry Laboratory I *Credit Hours: 1*
- CHEM 2250 - Organic Chemistry I *Credit Hours: 3*
- CSCI 1100 - Computer Science I *Credit Hours: 4*
- PHYS 1100 - Physics I *Credit Hours: 4*

## Second Year, Spring term

### • CURRENT TEMPLATE

- BIOL 4620 - Molecular Biology *Credit Hours: 4*
- CHEM 2240 - Organic Chemistry Laboratory II *Credit Hours: 1*
- CHEM 2260 - Organic Chemistry II *Credit Hours: 3*
- CSCI 1200 - Data Structures *Credit Hours: 4*
- PHYS 1200 - Physics II *Credit Hours: 4*

## Second Year, Fall term

### • PROPOSED TEMPLATE

no change

## Second Year, Spring term

### • PROPOSED TEMPLATE

no change

# BFMB TEMPLATE CHANGE

## Third Year, Fall term

### • CURRENT TEMPLATE

- HASS Elective *Credit Hours: 4*
- **Math Elective**  
(See footnote 1 below)
- BIOL 4760 - Molecular Biochemistry I *Credit Hours: 4*
- CHEM 4330 - Drug Discovery *Credit Hours: 3*
- CHEM 4340 - Drug Discovery Laboratory *Credit Hours: 1*

## Third Year, Spring term

### • CURRENT TEMPLATE

- **HASS Elective** *Credit Hours: 4*
- HASS Elective *Credit Hours: 4*
- Elective *Credit Hours: 4*
- BIOL 4770 - Molecular Biochemistry II *Credit Hours: 4*

## Third Year, Fall term

### • PROPOSED TEMPLATE

- HASS Elective *Credit Hours: 4*
- BIOL 4630 - Molecular Biology II *Credit Hours: 4*
- BIOL 4760 - Molecular Biochemistry I *Credit Hours: 4*
- **Elective** *Credit Hours: 4*

## Third Year, Spring term

### • PROPOSED TEMPLATE

- BIOL 4550 - Molecular Modeling *Credit Hours: 4*
- HASS Elective *Credit Hours: 4*
- Elective *Credit Hours: 4*
- **Depth Elective**  
(See footnote 1 below)

# BFMB TEMPLATE CHANGE

## Fourth Year, Fall term

### • CURRENT TEMPLATE

- *Elective Credit Hours: 4*
- BIOL 4540 - Sequence Analysis *Credit Hours: 4*
- BIOL 4630 - Molecular Biology II *Credit Hours: 4*
- BIOL 4720 - Molecular Biology Laboratory *Credit Hours: 4*

## Fourth Year, Spring term

### • CURRENT TEMPLATE

- *Elective Credit Hours: 4*
- *Elective Credit Hours: 4*
- *Culminating Experience Credit Hours: 4*  
(See footnote 2 below)
- BIOL 4550 - Molecular Modeling *Credit Hours: 4*

## Fourth Year, Fall term

### • PROPOSED TEMPLATE

- *HASS Elective Credit Hours: 4*
- BIOL 4540 - Sequence Analysis *Credit Hours: 4*
- BIOL 4720 - Molecular Biology Laboratory *Credit Hours: 4*
- *Depth Elective*  
(See footnote 1 below)

## Fourth Year, Spring term

### • PROPOSED TEMPLATE

- *Elective Credit Hours: 4*
- *Elective Credit Hours: 4*
- *Culminating Experience Credit Hours: 4*  
(See footnote 2 below)
- *Depth Elective*  
(See footnote 1 below)

# Footnotes

## Current

### Footnotes

1. Choose from one of the following courses: MATP 4600, CSCI 2300, or MATH 2400.
2. Chosen from one of the following courses: BIOL 4550, BIOL 4900. or BIOL 4990 or by department approval of another course or project.

## Proposed

### Footnotes

1. **Depth elective.** Choose three, at least one from each list. **Experimental List:** CHEM 4300, BIOL 4770, BCBP 4870, CHEM 2440, CHEM 4310, BCBP 4710, BCBP 4310, BCBP 4640, BCBP 496X. **Computational List:** MATP 4600, CSCI 2300, MATH 2400, MATH 4720, CSCI 4020, CSCI 4380, CSCI 4800, CSCI 4390, CSCI 4400, CSCI 4100.
2. BIOL 4900 or BIOL 4990 or by department approval of another course or project.

# Elective recommendations

Boxed courses are Depth Electives. ~~Red~~ are additions to the list. ~~Strikeout~~ are removed from the list.

## Current

### • Elective Recommendations

#### Biochemistry

- BCBP 2990 - Research Thesis
- BCBP 2900 - Research in Biochemistry/Biophysics *Credit Hours: 3 to 4*
- BCBP 2930 - Out-of-Classroom Experience in Biochemistry/Biophysics *Credit Hours: 1 to 4*
- BCBP 2940 - Readings in Biochemistry/Biophysics *Credit Hours: 1 to 4*
- BCBP 4310 - Genetic Engineering *Credit Hours: 4*
- BCBP 4640 - Proteomics *Credit Hours: 4*
- BCBP 4710 - Biochemistry Laboratory *Credit Hours: 4*
- BCBP 4870 - Protein Structure Determination *Credit Hours: 4*

## Proposed

### • Elective Recommendations Biochemistry

- BCBP 2990 - Research Thesis
- BCBP 2900 - Research in Biochemistry/Biophysics *Credit Hours: 3 to 4*
- BCBP 2930 - Out-of-Classroom Experience in Biochemistry/Biophysics *Credit Hours: 1 to 4*
- BCBP 2940 - Readings in Biochemistry/Biophysics *Credit Hours: 1 to 4*
- BCBP 4310 - Genetic Engineering *Credit Hours: 4*
- BCBP 4640 - Proteomics *Credit Hours: 4*
- BCBP 4710 - Biochemistry Laboratory *Credit Hours: 4*
- BCBP 4870 - Protein Structure Determination *Credit Hours: 4*
- BCBP 496X - Methods in Biophysics. *Credit Hours: 4*

# Elective recommendations

## Current

- Elective Recommendations  
Biology

- BIOL 2500 - Genetics and Evolution *Credit Hours: 4*
- BIOL 4270 - Human Physiology *Credit Hours: 4*
- BIOL 4740 - Cell and Developmental Biology Laboratory *Credit Hours: 4*

## Proposed

- Elective Recommendations  
Biology

- BIOL 2500 - Genetics and Evolution *Credit Hours: 4*
- BIOL 4270 - Human Physiology *Credit Hours: 4*
- BIOL 4740 - Cell and Developmental Biology Laboratory *Credit Hours: 4*
- BIOL 4770 - Molecular Biochemistry 2. *Credit Hours: 4*

# Elective recommendations

## Current

- Elective Recommendations  
Chemistry

- CHEM 2440 - Physical Chemistry for Life Sciences *Credit Hours: 4*
- CHEM 4300 - Medicinal Chemistry *Credit Hours: 4*
- CHEM 4310 - Bioorganic Mechanisms *Credit Hours: 4*
- CHEM 4410 - Macroscopic Physical Chemistry *Credit Hours: 4*
- CHEM 4420 - Microscopic Physical Chemistry *Credit Hours: 3*
- CHEM 4620 - Introduction to Polymer Chemistry *Credit Hours: 3*
- CHEM 4640 - Experimental Techniques in Macromolecular Chemistry *Credit Hours: 3*
- CHEM 4810 - Chemistry of the Environment *Credit Hours: 4*

## Proposed

- Elective Recommendations  
Chemistry

- CHEM 2440 - Physical Chemistry for Life Sciences *Credit Hours: 4*
- CHEM 4300 - Medicinal Chemistry *Credit Hours: 4*
- CHEM 4310 - Bioorganic Mechanisms *Credit Hours: 4*
- CHEM 4410 - Macroscopic Physical Chemistry *Credit Hours: 4*
- CHEM 4420 - Microscopic Physical Chemistry *Credit Hours: 3*
- CHEM 4620 - Introduction to Polymer Chemistry *Credit Hours: 3*

# Elective recommendations

## Current

- Elective Recommendations  
Computer Science

- ~~CSCI 2200 - Foundations of Computer Science Credit Hours: 4~~
- CSCI 2300 - Introduction to Algorithms Credit Hours: 4
- CSCI 4020 - Computer Algorithms Credit Hours: 4
- ~~CSCI 4260 - Graph Theory Credit Hours: 4~~
- CSCI 4380 - Database Systems Credit Hours: 4
- MATP 4600 - Probability Theory and Applications Credit Hours: 4
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## Proposed

- Elective Recommendations  
Computer Science

- CSCI 2300 - Introduction to Algorithms Credit Hours: 4
- CSCI 4020 - Computer Algorithms Credit Hours: 4
- CSCI 4380 - Database Systems Credit Hours: 4
- **CSCI 4800 Numerical Computing. Credit Hours: 4**
- **CSCI 4390 Data Mining . Credit Hours: 4**
- **CSCI 4400 Xinformatics . Credit Hours: 4**
- **CSCI 4100 Machine and Computational Learning. Credit Hours: 4**



# Elective recommendations

## Current

- Elective Recommendations  
Mathematics

- MATH 2010 - Multivariable Calculus and Matrix Algebra  
*Credit Hours: 4*
- MATH 2400 - Introduction to Differential Equations  
*Credit Hours: 4*
- MATH 4720 - Mathematics in Medicine and Biology *Credit Hours: 4*
- MATP 4600 - Probability Theory and Applications *Credit Hours: 4*

## Other

- ISYE 4140 - Statistical Analysis *Credit Hours: 4*
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## Proposed

- Elective Recommendations  
Mathematics

- MATH 2010 - Multivariable Calculus and Matrix Algebra  
*Credit Hours: 4*
- MATH 2400 - Introduction to Differential Equations  
*Credit Hours: 4*
- MATH 4720 - Mathematics in Medicine and Biology *Credit Hours: 4*
- MATP 4600 - Probability Theory and Applications *Credit Hours: 4*

## Other

- ISYE 4140 - Statistical Analysis *Credit Hours: 4*
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