Directions for Undergraduate Program Director Reports:

1. Talk to students in your major, ask around if there are any current academic issues. (ex: class conflicts within the major, issues with professors, etc)

2. Look at Degree Navigator, write down the course requirements

3. Formulate a list of things you would like to know about the program (corporate connections with the university, current research projects, opportunities for students to get involved, etc)

4. Email Undergraduate Program Director and Arrange Appointment

5. Fill out Undergraduate Report Sheet

6. email to vicepresident@sgc.rutgers.edu and complete by December 4th

I. Major Options - What options are offered within the major? How do they differ?

Biochemistry of Microbial Systems - The specificity of this major results from it mixing biochemistry with microbiology. Topics such as microorganisms and microbial infections will be closely examined through the study of this major.
Biochemical Toxicology - This option for a major in biochemistry is more focused on its analysis of the toxic compounds across the field of biochemistry. Study of this topic shows an application of biochemistry through the appropriate treatment of illness or preventative approach to toxic elements.
Biochemistry of Plant Systems - Biochemistry may also be observed through a more ecological lens through the offering of this major. It explores the influence plants have on the applied research of biochemistry as well as how plants influence the development of public policy.
Protein and Structural Biochemistry - By following the course path for this major, students will gain a deeper understanding of the structure and function behind biochemistry. This constitutes a close examination of proteins across the topics of biochemistry and how they may be used to solve problems.
General Option - This option is ideal for those wishing to explore biochemistry without any of the above mentioned specificities. Students following this major will study biochemistry and understand how it is represented across the field of science.

II. Total number of students within the major?

Around 212 students are studying Biochemistry at Rutgers University - New Brunswick.

III. Goals within the major-What are the expectations of students post-graduation?

Post-graduation, students of biochemistry are expected to …

1. Understand the ideologies of chemistry, physiology, evolution, and biochemistry.
2. Be well versed in the modern laboratory environment.
3. Be knowledgeable of the issues of ethics within the molecular life sciences.
4. Have a diverse view when analyzing the components of an issue from a microscopic level to organisms as a whole.
5. Be proficient in oral and written examinations.
6. Have the ability to conduct a close analysis of papers.
7. Be able to create follow-up experiments.

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Major: Biochemistry
Date: 13 March 2020
Semester: Spring 2020

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IV. Major Courses-What is the goal of each course? What should students be learning?

Biology Course Requirement: This requirement assures that students are proficient in the biological concepts needed to further engage in the world of biochemistry.

Chemistry Course Requirement: Through taking these chemistry course, students are presented with the basic knowledge of chemistry that lays a foundation for biochemistry.

Physics Course Requirement: Physics courses assure that students within the major form a knowledge of the ways in which one may analyze a complex problem quantitatively. Students are additionally introduced to the analytical knowledge needed to succeed in a laboratory setting.

Physics Lab Requirement: This assures that students have a proficient understanding of the topics posed to them in their physics courses. Students should be learning how to apply the concepts posed to them in physics classes in a real-world context.

Biochemistry Course Requirement: These courses teach students of the biochemical concepts that are essential for an understanding of the topic.

Organic Chemistry Course Requirement: Organic Chemistry classes establish the foundation that students need to succeed in later classes of the major, such as biochemistry. The course material is centered on the chemical compounds that create the organisms around us.

Organic Chemistry Lab Requirement: This assures that students have a proficient understanding of the topics posed to them in their organic chemistry courses. Students should be learning how to apply the concepts posed to them in organic chemistry classes in a real-world context.

Experience-based Education Requirement: Through engaging in this requirement, students are given a real-life look into the occupational options posed to them by biochemistry. Students

should be learning things such as lab techniques that will be needed for their complete success in the workforce.

Quantitative Methods Requirement: This requirement ensures that students of biochemistry have the mathematical knowledge needed to handle and figurations that come to them in the laboratory setting. To succeed within the field, this requirement asks students to take up to the Calculus II level of mathematics.

Biochemical Technology / Techniques Requirement: This requirement exposes students to classes that assure their ability to handle the technology faced by those in the field of biochemistry, whether that be pre or post- grad.

Professional Ethics Requirement: Through partaking in the courses that fulfill this requirement, students are establishing themselves in a professional sense and confirming their ability to succeed in the modern professional world.

VI. Things going on within the major (Research, Visitors, Talks, Seminars within the major):

Seminars:

- "Don't Miss the Microbes for the Trees: A Microbial Mechanism Fostering Future Ecosystem Carbon Storage" by Zachary Freeman

Research:

- See section VII

V. Concerns/Student issues with classes? How to resolve, suggestions?

- The number of credits required by the major is placing some stress on students. In order to resolve this, perhaps a more detailed four year plan could be drawn out for students majoring in biochemistry. Though the major may seem credit-intensive when compared to other offered programs of study at Rutgers, a detailed plan for how and when to take courses would prove beneficial to students.
- Confusion by some students as to why Calculus 152 is required - if it is needed to cover the concepts gone over in physics. Though this level of mathematics is not a prerequisite for the level of physics needed for the major, an argument can be made for its necessity in further study of the concepts of biochemistry.
- Organic chemistry is a prerequisite for many of the later courses required by the biochemistry major, and yet the sections offered for this coming Spring filled up very

quickly. Students with less credits are stuck not being able to take organic chemistry (unless spots open up), which further delays them from taking classes later asked for by the major. In order to combat this, more sections of organic chemistry may be opened. This can be done through offering more locations where it is run. This may pose as a burden to the school, as this would require both open classroom and an available teacher. My suggestions for this are to run more synchronous lectures, in which the professor is not necessarily in the same room as all of their students, but there is still a real-time lesson happening. The effectiveness of this plan would have to be tested in action.

- One student voiced a concern on how they are taking a course with contemporary challenges in the name, and yet it does not count for the Contemporary Challenges Core Requirement within the School of Environmental and Biological Sciences. Handling this individualized issue would come about by contacting authority over the school as a whole and requesting that this course be added to courses that count for the Contemporary Challenges Core Requirement.
- Due to the current COVID-19 situation, students may experience difficulties within the major due to the transfer of places to online ones. A major in Biochemistry constitutes taking classes such as General Chemistry/Biology, Organic Chemistry, and General Biochemistry. Students may perceive these classes to be more difficult online, which resultantly makes obtaining a degree in Biochemistry more difficult.

VII. Research Opportunities

Listed on the Major's homepage at: https://dbm.rutgers.edu

Current Offerings…

- algal phylogeny and evolution
- bioinformatics approaches to protein function prediction and genome variation analysis
- detection and response of organisms to oxidative stress
- elucidating prokaryote activities in geothermal environments
- protein folding and subunit assembly
- gut microbiomes and health
- microbial degradation of environmental pollutants
- microbial ecology of arctic soils
- microbial transformation of metals
- xenobiotic metabolism in aquatic animals

VIII. Job Outlook, suggestions for students in this major (ex: organizations to join, news to pay attention to):

- G.H. Cook Biochemistry and Microbiology Club: This club surrounds biochemistry majors with alike students who can relate with the academic struggles posed by classes. This is an option to allocate time to having some fun while also remaining in the swing of school. In addition to this, there exists an opportunity to network within the club and discover opportunities related to the major that others students have partaken in.
- Cell Biology and Neuroscience Society: This club poses students with the unique opportunity to create connections within the medical field. For students following the pre-med track, this club is a good option to get exposure through the various trips it holds to medicals schools.
- Job Outlook: There is a projected growth rate of approximately 6% for those studying Biochemistry between 2018 and 2028. This is specifically for students wishing to become biochemists, though the outlook for related professions (such as those wishing to go medical with their degree) are also positive.

IX. Changes within the major in the upcoming year?

- The main changes viewed by students within biochemistry will be wrought by the implementation of Course Atlas. This will constitute differences in scheduling based on what the program calculates as optimizing travel time for students on the basis of where students are living, where other classes are situated, and optimal travel time for traffic.
- The only other projected changes are the differing research opportunities, which again will be updated on the Biochemistry Homepage for Rutgers University.