# CMB Majors, Information for Students & Advisors, February 2021

The following information addresses some common questions regarding scheduling of courses.

**In general**, you will have no problem accounting for prerequisites & completing your degree in a timely manner if you:

1. take CMB 155 (Introduction to Cell & Molecular Biology) & 156 (Discoveries in Cell & Molecular Biology),& CHM 115 & 116 (Principles of Chemistry I & II) in your freshman year.
2. take CMB 250 (Introduction to Biotechnology), BIO 375 & 376 (Genetics lecture & lab) & CHM 241 & 242 (Organic Chemistry series) in your sophomore year.
3. take CMB 405 & 406 (Cell & Molecular Biology lecture & lab) in your junior year or first semester of your senior year.
4. **begin independent research** **prior to your final Fall semester**. We encourage you to begin research **much, much earlier** in your undergraduate career. It can be beneficial to at least begin your research during the spring/ summer periods. You will ultimately be presenting your research in the Capstone course (CMB 495) which is offered in the Winter semester & generally is taken during your final semester. You will hear about research options in the CMB 250 course, but please also talk with your advisor. Information regarding research &internship opportunities is also posted on the CMB website. See the next page for more information.

5. use MyPath & the CLAS Advising Center CMB Advising/Curricular Guide <https://www.gvsu.edu/clasadvising/clas-major-requirements-guides-cell-molecular-biology-40.htm>

6. meet with your advisor regularly. **Do not panic(!) if you did not take the courses in the above order**.

If you have changed majors to CMB or are a transfer student & have already taken BIO 120 or its equivalent, you will need to take the CMB 156 Discoveries in Cell & Molecular Biology (1 cr) laboratory course.

**Additional options**

**CMB Combined BS/MS Degree Program**- Upon finishing this program (designed to take 5 years), you will have both a BS and an MS degree from the CMB Department – **this is both a time & tuition dollar-saving program**. You apply for entrance to this program as a junior after taking the coursework required for consideration (<https://www.gvsu.edu/cmb/combined-degree-program-accelerated-bs-ms-in-cell-82.htm>). Please take a look at this link for more information & talk to your advisor if you are interested. You will apply using the graduate application site: <https://www.gvsu.edu/admissions/graduate-application-24.htm>

**Bioinformatics & Genomics Certificate** – This certificate requires 3 core courses (one of which you will take as a CMB majors requirement) plus one elective from a list of options. Check out this link for more information: <https://www.gvsu.edu/cmb/certificates-93.htm>

**GVSU policy**

1. Courses can be repeated once without additional permissions.
2. Prerequisites are enforced through Banner.

**COVID-19**

If we are still dealing with COVID-19 in the Fall &/or Winter, most lecture courses will be online & labs will be offered in the hybrid format. ***Pay close attention to these details in Banner.***

**Information regarding required courses**

**Math requirement**

Either MTH 125 (3 credits) OR 201 (4 credits) is acceptable for the CMB major.

**Physics requirement (5 credits for each of two semesters)**

PHY 230/231 is a calculus-based physics series; take this series if you have a strong interest. Otherwise, take the PHY 220/221 series. Note that PHY 221 requires some knowledge of trigonometry (covered in MTH 123). If you took the math placement exam & were placed in MTH 201, you should be fine. If you have not had trigonometry before, you will want to take MTH 123 prior to taking PHY 221. *If you are*

*planning on medical school in the future, you should take physics at GVSU rather than at a community college.*

**CMB 250 – Introduction to Biotechnology (4 credits)**

One section is offered in each of the Fall & Winter semesters. ***This class fills up so do not delay registering for it*.** *If you can’t register because it is full, please contact the listed instructor immediately.*

**CHM 241, 242 – Organic Chemistry (9 credits total for the two semesters)**

You can substitute CHM 245 through 248 for the CHM 241/242 Organic Chemistry series; this option is included on the Advising Curricular Guide for CMB Majors (posted on the CLAS Advising site).

**CMB 405 – Cell & Molecular Biology lecture (4 credits)**

CMB 405 is offered Fall & Winter semesters. You must complete the organic chemistry requirement & BIO 375 Genetics before taking CMB 405. There are 2 sections offered in the Fall & 3 in the Winter.

**CMB 406 – Cell & Molecular Biology Laboratory (2 credits)**

This course can be taken concurrently with CMB 405. Note that CMB 406 is the prerequisite for CMB 426 & these two courses ***cannot*** be taken concurrently. This course is offered both Fall & Winter semesters**.** Note also that CMB 406 is an SWS course – as such, you must get a grade of C or better to get SWS credit.

 **CMB 409 Responsible Conduct of Research** **(1 credit)**

This is a newer requirement for the major. The course is offered Winter semesters only.

**CMB 426 – Research Applications in Nucleic Acids (4 credits)**

This course is offered in the Fall semester (Tues/Thurs afternoons). However, ***if you need to take it in the Winter semester, you will register for CMB 626*** which is held at CHS (downtown) on Mon/Wed mornings (so don’t schedule an Allendale class immediately afterward as you will need travel time). Since in the Winter semester you are registering for a course with a graduate number, you will fill out additional paperwork when you register – the dual credit form. (The graduate & undergraduate sections of this course are the same except that graduate students do an additional presentation; as an undergraduate in CMB 626, you will not do the additional work, but will attend the presentations.) CMB 406 is the prerequisite for this course. If you are planning on submitting applications in the Fall for graduate school, you may well be interviewing for graduate programs during the Winter semester. Therefore, we recommend you take CMB 426 in the Fall. ***This course often fills, so do not delay in registering for this class.*** *If you cannot register because the course is full, please contact the listed instructor.*

**CMB 451 – Bioinformatics: Tools & Techniques for Life Sciences (3 credits)**

This course is a more recent requirement (& replaces the previous microbiology requirement). This is also one of the requirements for the Bioinformatics & Genomics certificate. Microbiology (either BIO 357 OR BMS 212/213) is now an elective.

**CHM 461 – Biochemistry I (4 credits)**

This course is offered Fall, Winter, & Spring semesters. The pace is very fast if you take the Spring section, so do not plan on taking any other courses at the same time. Pay close attention to the section locations as some sections are downtown & some are on the Allendale campus.

**CHM 462 – Techniques in Biochemistry (3 credits)**

Two sections are offered in the Fall semester & three in the Winter semester (Tues/Thurs morning & Tues/Thurs afternoon sections both semesters, plus a Mon/Wed evening one in the Winter). ***All five sections are offered at CHS downtown, so don’t schedule this back-to-back with an Allendale course as you need to allow for travel time.*** If you are planning on submitting applications in the Fall for graduate school, you may well be interviewing for graduate programs during the Winter semester. Therefore, if you want to take CHM 462 in the Winter, you will want to register for the morning section as it will interfere less with the typical grad school interview schedule. Note that this is also an SWS course so you need to get a minimum grade of a C for the SWS credit. ***Note: taking CMB 426 & CHM 462 the same semester – it is do-able, but you will be very busy & may have just one hour between them (on different campuses). If you can, take them separate semesters.***

**CMB 495 – Perspectives in Cell & Molecular Biology (Capstone; 3 credits)**

The Capstone is offered in the Winter semester only. Remember, you must have previously been registered for CMB/BIO/BMS/CHM 499 (Independent Research) or 490 (internship) before you can register for CMB 495. ***You must have initiated your research well before the semester you take the Capstone course as you will be doing an oral presentation of your research in this course during the April Undergraduate Research Symposium.*** *If you cannot register because the course is full, please contact the instructor as soon as possible.*

**CMB 499 – Independent Research *or* CMB 490 – Internship**

You are required to do at least 3 credits of research as a CMB major; you can do more than 3 (& many of our majors do). To register for these credits, you will fill out the Registration Permit form to submit to the CMB office (3300A Kindschi Hall) which will then go to Dr. Staves. With his approval, you will be able to register for CMB 499 through Banner. (The form is also available online from the CMB Department’s ‘Forms’ link under Faculty/Staff & under the Current Students tab on the Biology Department’s website.) If you will be doing research with a GVSU faculty member, they may also ask you to fill out a second short form at the same time for funding for supplies for your research. As mentioned earlier, there will be several opportunities to learn about research options, & there are many options as to where you do the research. That said, it is great to start asking about it early. You can do research here with a GVSU faculty member (from a variety of departments), with a mentor at the Van Andel Research Institute or with MSU faculty downtown, elsewhere in the country (or world) through an established research/internship program (see the CMB website for suggestions), or via an internship situation you identify & which is approved by GVSU. To get started thinking about research, please talk with your advisor & with other students.

**Possible electives**

**CMB 140 Living Foods: Ferment Them Yourself (4 credits)**

An introduction to fermentation as a part of food preparation. The history and human culture, food preservation and safety aspects, and the science of fermentation processes related to food and health will be covered. The laboratory includes the hands-on applications of fermentation in the preparation of bread, yogurt, kefir, and sauerkraut and other vegetables, etc. as is done in home kitchens. *As a CMB major, this will count toward your 120 total credits, but not as a CMB-specific elective.* Course offered winter semester.

**CMB 321 – Designing Our Future: Babies, Food, Medicine, and Biotechnology (3 credits)**

***Issues course*** which introduces the concepts and theories of biotechnology, and includes an in-depth exploration of a biotechnology issue, such as designer babies, GMO food, and personalized medicine, within a group setting. Student groups will create a White Paper and lead a discussion on the biotechnology issue of their choice. Part of the Information, Innovation, and Technology Issue. Course offered fall semester. Prerequisite: Junior standing. ***Note that this counts as both a CMB elective AND an issues course.***

**CMB 350 – Foundations of Brewing (3 credits)**

Introduction to history, culture, theory and practice of brewing. Students design and brew a beer of choice. Implications of beer consumption on social, psychological and biological health are emphasized. Effects of human migration, technological advances, economics, culture and globalization on beer production are also addressed. Part of the Health Issue. Course offered fall, winter, & spring semesters. Prerequisite: Junior standing. ***Note that this counts as both a CMB elective AND an issues course.***

**CMB 452 Computer Modeling & Drug Design (3 credits)**

This course covers three groups of topics in computational structural biology: protein structure prediction, molecular simulations and structure-based drug design. Offered winter semester. Prerequisites: CMB 250 or CHM 461, PHY 220/PHY 221 or PHY 230/PHY 231, or **permission of the instructor. If you have problems with the prerequisites, please contact Dr. Szarecka at****szarecka@gvsu.edu****.  *Note that this is one of the core courses for the Bioinformatics & Genomics certificate.***

**CMB 460 Molecular Diagnostics (3 credits)**

Offered Fall only. This course provides principles and applications of genomics and molecular tools for disease diagnostics.  Topics include molecular and computational tools of genomics, genome structure, diagnosis of disease, gene expression, and biological networks. Prerequisites: BIO120, and BIO 355 or BIO 375 or permission of instructor. ***Note that this is one of the core courses for the Bioinformatics & Genomics certificate.*** If you are interested in the certificate, you must apply to the program; see the CMB website for more information: <https://www.gvsu.edu/cmb/certificates-93.htm>

**CMB 620 Cell Culture & Bioprocessing (3 credits)**

Theory and practice of eukaryotic and prokaryotic cell culture methodology, including the use of fermenters and bioreactors. The application of culture methods and bioprocessing for use in biotechnology will be stressed. Offered winter semester. Prerequisite: CMB 520 or equivalent ***or permission of the instructor***.

***While we believe the information in this document is correct, please be sure to confirm details in Banner.***