



UNDERGRADUATE HANDBOOK

Biology Department
Academic Year 2022-2023



Handbook for Undergraduate Majors in Biology

Introduction:

Welcome to the Department of Biology at CatholicU! This handbook is intended to provide useful information for students majoring in Biology, and serves as a supplement to the essential information that is provided in the Arts & Sciences “Advising Handbook” (<https://arts-sciences.catholic.edu/academics/undergraduate-programs/advising-handbook/index.html>). It is important you read through this information and keep it handy during your four years with us. The items covered here contain information that is nowhere else gathered into a user-friendly format and that may be otherwise hard to find.

Biology is a small, research-active department in which students are known by the faculty and interact with the faculty. Undergraduate courses are taught by faculty who take their teaching duties seriously. Faculty are readily available for consultation outside of the classroom. Graduate students, under the direction of faculty, serve as teaching assistants in the laboratory portions of courses, but do not teach the courses.

Those who receive a B.S. or B.A. degree in Biology at CUA are well prepared for a variety of career options, and for graduate-level training in modern biology, medicine, dentistry, veterinary science, physical therapy and other fields. A rigorous program of pre-medical advising (see Pre-Medical Advising Program,) across the four years of undergraduate study prepares students for application to medical school and related programs.

Opportunities exist for undergraduate involvement in ongoing faculty research programs (for example, see Research Problems, below). Research participation provides valuable, hands-on engagement in the scientific process and is an essential part of college-level science education. Undergraduate students who have sustained involvement in a research program have become authors on scientific papers published in scholarly journals.

The atmosphere within the Department is one of collegiality. Each semester social events (dinners, ice cream social, *etc.*) are held that foster interaction among the students and faculty, and which are intended to foster the sense of community within the department. Students are fully encouraged to participate in all aspects of the Biology community.

Academic Advising in Biology:

Upon matriculation, each student who has indicated a desire to major in Biology is assigned to a member of the faculty who will normally serve as the student’s academic advisor for the full four years of undergraduate study. Under circumstances in which an advisor is on leave from campus, advisees are assigned to another advisor for the duration of their regular advisor’s absence. In addition, the department has a Director of Undergraduate Studies who is available for additional consultation or when the regular advisor is unavailable. The current director is Dr. Ann Corsi who can be reached at corsi@cua.edu.

Your academic advisors consider their role to be an important one and will help you plan a successful path toward graduation. Active, responsible involvement of the student in this process is, however, essential. Students must meet with their academic advisors prior to course registration for each new semester, but are encouraged to consult with their advisors whenever questions need to be resolved. Your advisor serves as a useful resource in helping you complete your degree program, and in helping you plan for life after graduation. The easiest way to make an appointment with your advisor is to send an email indicating multiple times when you are available to meet so your advisor can consult their schedule and send you back a mutually-

convenient meeting time.

Students who feel that their needs would be better met by being assigned to a different academic advisor can easily arrange to make such a switch by consulting with the department's Advising Coordinator, Ms. Marion Ficke (McW 212; 202-319-5870; ficke@cua.edu). It is understood that a student may feel more comfortable interacting with a different advisor, and there are no problems involved with making such a change.

The following members of the Biology faculty currently serve as academic advisors:

Ms. Marion Ficke —Advising Coordinator (*Rm. 212 McCort-Ward, 202-319-5870, ficke@cua.edu*)

Dr. Ann Corsi—Director of Undergraduate Studies (*Rm. 206 McCort-Ward, 202-319-5274, corsi@cua.edu*)

Dr. Pamela Tuma—Chair, Department of Biology (*Rm. 261A Nursing-Biology, 202-319-6681, tuma@cua.edu*)

Dr. John Choy (*Rm 105 McCort Ward 202-319-5278, choy@cua.edu*)

Dr. Justin Chung (*Rm. 356 Nursing-Biology, 202-319-5279 chung@cua.edu*)

As an additional layer of support for CatholicU students, the Center for Academic Success (<https://success.catholic.edu/>) assigns each student an Academic and Career Advisor. These individuals can help students with choosing non-science courses, obtaining tutoring and academic coaching, adjusting to college academic life, and with career support such as resumé and interviewing help. If your Biology advisor is unavailable, they also can provide advice about science courses, but it is always advisable to confirm with your Biology advisor prior to each semester that you have registered for the appropriate courses that will keep you on track for on-time graduation.

B.S. vs. B.A. Degree Programs in Biology:

Degree programs available through the Department of Biology include: B.A. in Biology and B.S. in Biology. In addition, two 5-year combined B.S/M.S. or B.A./M.S. degree programs are available (<https://arts-sciences.catholic.edu/academics/undergraduate-programs/ba-ma-programs/index.html>) in Cell and Microbial Biology and in Biotechnology (<https://biology.catholic.edu/academics/undergraduate/bio-bs-ba/index.html>).

Students who choose to major in Biology have the option of following either a Bachelor of Science (B.S.) or Bachelor of Arts (B.A.) degree program. In deciding which of these programs you wish to choose, you should know that in terms of future career goals there is no particular advantage to one over the other. That said, there are certainly personal and practical considerations that are important in choosing the B.A. or B.S. program. The main difference between the degrees is the B.A. requires two fewer Biology Electives and the completion of a Focus Area in the Liberal Arts Curriculum. Examples of Focus Areas are Liberal Arts Concentration in liberal studies or the enduring questions, a minor, certificate or double major/dual degree, the study of an additional language to the intermediate level or completing two honors tracks. For B.S. students, the science concentration counts as the Focus Area (see this link for more information: <https://arts-sciences.catholic.edu/academics/undergraduate-programs/advising/curriculum-requirements.html>). For most students, a B.S. will provide more flexibility with electives. A student wishing to pursue a B.A. should consult their academic advisor or the Director of Undergraduate Studies to ensure that they can complete all of the requirements in four years.

Half of the required courses for Biology majors are taken in Biology, Chemistry, Physics, and Math with associated labs. The other half of the courses needed for graduation are in two areas – the Liberal Arts Curriculum (<https://sites.google.com/cua.edu/first-semester/first-semester-course-advice/liberal-arts-curriculum>) and electives. Information about the Liberal Arts Curriculum can be found here: <https://undergraduate-studies.catholic.edu/curriculum/new-curriculum/index.html> and information about the course options can be found here: https://docs.google.com/document/d/1WXG_sc31wxZFEPIW3qDxGUdJgc0_VTjyst2W_KPbaCA/edit. Elective courses can be any 3-credit course of interest to students that a science major is eligible to take (e.g., not science courses for non-majors such as Biol 103/104 or Chem 109). Sometimes elective courses are used to fulfill prerequisites-for example if a student tests into pre-calculus instead of the first calculus course or if a student needs to take introductory language courses before reaching the required intermediate language courses. Students who are planning to continue on to professional school use electives for their pre-requisites such as statistics or anatomy and physiology. Often, students use their elective courses to earn one or more minors or certificates (<https://arts-sciences.catholic.edu/academics/undergraduate-programs/minors/index.html>) such as a Minor in Psychology or the Spanish for Health Care Certificate.

Suggested B.A. and B.S. Course Sequences:

The course sequences listed below work well, but for many courses there is flexibility as to when the course may be taken. Students should always consult with their academic advisors to determine whether a change in the standard course sequence is recommended. You can see a spreadsheet to track your progress in the Appendix and download a fillable spreadsheet here:

<https://docs.google.com/spreadsheets/d/1xh0I6Z3NUsK0cIwFQCWvCwIM0U68gN7T/edit?usp=sharing&oid=106775104888394986935&rtpof=true&sd=true>

Year	First Semester	Second Semester
First Year	<ol style="list-style-type: none"> 1. Biol 105 & 115 2. Chem 103 & 113 3. Eng 101 or TRS 201 4. Phil 201 5. Elective 	<ol style="list-style-type: none"> 1. Biol 106 & 116 2. Chem 104 & 114 3. TRS 201 or Eng 101 4. Phil 202 5. Elective
Second Year	<ol style="list-style-type: none"> 1. TRS 202 2. Biol 217 3. Chem 203 & 213 4. Math 111 or 121* 5. Language 103^ or Elective 	<ol style="list-style-type: none"> 1. Biol 317 2. Chem 204 & 214 3. LAC (e.g., Social Science)** 4. Math 112 or 122 5. Language 104 or Elective
Third Year	<ol style="list-style-type: none"> 1. Biol 307 2. Phys 205 & 225 3. Biol 454 4. LAC (e.g., History/Politics) 5. LAC (e.g., Fine Arts) 	<ol style="list-style-type: none"> 1. Biol Elective 2. Phys 206 & 226*** 3. Biol elective 4. LAC (e.g., Philosophy) 5. Elective
Fourth Year	<ol style="list-style-type: none"> 1. Biol 449 2. Biol Elective (for B.A.-a Focus Area course is taken instead) 3. LAC (e.g., Theology) 4. Elective 5. Elective 	<ol style="list-style-type: none"> 1. Biol 452 2. Biol Elective (for B.A.-a Focus Area course is taken instead) 3. LAC (e.g., Literature) 4. Elective 5. Elective

^The online Language placement test (<https://success.catholic.edu/incoming-students/registration/first-year-course-advice/foreign-language-placement/index.html>) must be taken before enrolling in a language. If a student places in a lower level language (below the 103 level), introductory language courses will be electives. If a student places out of the language requirement due to previous study or because they are native speakers, then they will take two elective courses instead of language courses. AP credit, if awarded, can replace language courses.

* The online Math placement test (<https://success.catholic.edu/incoming-students/registration/first-year-course-advice/calculus-placement/index.html>) must be taken before enrolling in calculus. Students who do not place into calculus will take Math 108 first. That course can be only an elective. Math can also be taken during the third year.

** “LAC” refers to the Liberal Arts Curriculum courses where you choose a course within a category such as Social Science. They can be taken in any order and specific areas are listed here as one example. See links on previous page for information about the courses in the LAC.

***There are no required biology or chemistry courses in second semester of the third year so if a student plans ahead and can take physics over the summer or in senior year, this can be a good semester for studying abroad.

Advanced Placement Credits and College-Level Credit in Biology:

If you took Advanced Placement (AP) Biology in high school, and received a score of 4 or 5 on the AP Biology test, then you are eligible to receive credit for one Elective. In the B.S. this can be either a Biology Elective or an Elective. In the B.A. it can only be an Elective.

Further information about AP and IB credits can be found here:

<https://www.catholic.edu/admission/undergraduate/first-year-students/ap-ib-dual-enrollment/index.html>.

Minimum Grade Requirements for Pre-requisite Courses:

Enrollment in some biology courses requires that a student receive a grade of C- or higher in a pre-requisite course. Biol 105 & 115 (Mechanisms of Life I) serve as pre-requisites for Biol 106 & 116 (Mechanisms of Life II). To be enrolled in Biol 106, a student must have received a grade no lower than C- in these courses. Similarly, a grade no lower than C- in Biol. 106 is required for enrollment in Biol. 217 (Molecular Genetics and Protein Engineering). Since registration for a coming semester is normally done prior to the issuance of final course grades, anyone lacking the C- minimum grade who has already registered for the next course in sequence will have to drop that course. Future enrollment in the course will depend upon successful completion of the pre-requisite.

This restriction prohibits a student from taking Biol. 106 or 217 without having received the minimum acceptable grade in prerequisite courses. It should be noted, however, that the minimum acceptable grade for all required Biology and Chemistry courses is a C- if the course is to count for credit towards graduation. Thus, if a grade of D or F is received in any of these required courses, the same course will have to be retaken and passed with a grade no lower than C-. The D or F grade originally received will remain on the student's transcript, but only the newer grade will be used to calculate the GPA if the course is taken at CUA. When repeating a course, only one of them will count towards graduation (of the 40 3-credit courses needed in addition to lab courses). Therefore, if a course is repeated during the academic year a student will need to take an extra course in a future semester to keep on track for graduation

Biology Elective Courses:

All Biology majors are required to enroll in 4 (B.S.) or 2 (B.A.) Biology Elective courses. The PARTIAL list below provides the courses that currently can be used as Biology Electives. Consult your academic advisor regarding the suitability of any other course that you feel would be appropriate for credit as a Biology elective and the Director of Undergraduate Studies, in conjunction with the Biology faculty, can be petitioned for approval. One Biology elective must be a 500 level lecture course (see line 9 on the Tracking Sheet in the Appendix) or BIOL 418.

Biology Electives:

Biol	232 & 233 with permission & when needed for professional school admission
	418 Physiology
	493 Research Problems in Biology (may be repeated once to count as two electives)
	538 Gene Organization and Expression
	555 Rational Drug Design
	559 Cell Structure and Function
	563 Developmental Biology
	565 Model Organisms and Human Disease
	566 Immunology
	572 Genomics, Proteomics and Personalized Medicine
	574 Viruses and Vaccines
	579 Principles and Practice of Biotechnology
	580 Entrepreneurial Biotechnology
	581 Essentials of Biotechnology Project Management
	583 Regulatory Processes for Domestic and Global Biotechnology
	584 Mechanisms of Bacterial Pathogenesis
	586 Molecular Genetics and Recombinant DNA Methodology
	596 Computational Genomics
	597 Fundamentals of Statistics in Biology, Medicine and Biotechnology
	598 Membrane Trafficking & Disease
	599 Signal Transduction and Biomembranes.

Elective Courses:

ELECTIVES allow students to explore a wide variety of subjects that include both science and non-science disciplines. As is true of all non-laboratory courses used for your degree, only courses of a minimum of 3 credits can be used.

Some students will use language courses below the 103 level as Electives. MATH 108, when it is required, is an Elective. Consult Cardinal Station for additional options.

Electives can even be chosen from among available Biology Electives and courses in other sciences (see list below).

The following is a non-exhaustive list of courses that biology students find interesting. They can be taken as “Free Electives”:

Chem	202 Forensic Chemistry
	317 Principles of Environmental Science (<i>NOTE - This course is-not a Biology Elective</i>)
	Higher level Chem Courses
CSC	Most 100-level CSC courses are acceptable.
Phys	103 Astronomy
Psy	304 Brain and Behavior
	445 Clinical Neuroscience
Anth	Courses in Physical and Cultural Anthropology

Math 114 Probability and Statistics

Psy 322 Introductory Statistics

Selected other courses in the Departments of Biology, Chemistry, Computer Science, and Mathematics, or The School of Engineering may be suitable for use as Electives. Approval for any unlisted courses must be obtained from Ms. Marion Ficke, the Advising Coordinator (202-319-5870, ficke@cua.edu).

Limitations for use of Biol 232/233 as Biology electives

Biol 232 and Biol 233 (Anatomy and Physiology I and II) are courses that are taught for freshman students in the School of Nursing. These courses are not typically open to Biology majors. Further, freshman-level courses are not accepted as Biology electives. However, Biology majors with career plans that **require** these courses as prerequisites for admission to other programs (*e.g.*, physical therapy or physician assistant programs) may be granted permission. In this event, the courses will be placed on the tracking sheet according to the following:

- If a student is earning a B.A., then Biol 232/233 must be electives.
- If a student is earning a B.S. then two of the Biology electives can be Biol 232/233, with permission.
- If a student is earning a BS and receives credit for Biol 418 as a Biology elective, then only Biol 232 can be used as a Biology elective, and Biol 233 would then be an elective.

Research Problems (During the academic year or summer):

Biol 493 (Research Problems in Biology I and II) provide Biology majors with the opportunity to engage in independent laboratory research under the direction of a member of the Biology faculty. The specific research projects that may be undertaken will depend upon the research interests of the member of the faculty who serves as your Research Problems mentor.

Laboratory research at this level offers an excellent learning experience and integrates what you have learned in lecture courses and their associated teaching laboratories into pursuit of an actual scientific goal.

If you are interested in participating in Research Problems, please keep the following facts in mind:

1. Before registering for Biol 493, make appointments with the members of the faculty with whom you might like to work. Check the on-line descriptions of Biology faculty research interests (<https://biology.catholic.edu/faculty-and-research/areas-of-research/index.html>) to get an idea of the kinds of work that are underway in each laboratory. Find out whether a professor has room in the laboratory for a Research Problems student in the coming semester, and get an idea of the types of project on which you might work.
2. Never register for Biol 493 without having come to a clear agreement with a member of the faculty who has agreed to be your mentor for a research project.
3. Be prepared to put in sufficient time in the laboratory to allow you to make progress on your project. For laboratory sections associated with lecture courses

the rule of thumb is that you get one hour of academic credit for each two to three hours that you spend in the laboratory. Application of this rule to the 3 credit hours offered for Biol 493 indicates that you should expect to spend a minimum of 6-9 hours each week working on your project. Be prepared to show some flexibility in this regard since some weeks may require a bigger commitment of time and others less, depending on what is happening with your project. Be sure that you have sufficient flexibility in your weekly schedule to allow a research project to be undertaken.

3. Grades for Biol. 493 are based on a variety of factors, including commitment, demonstration of knowledge on the research topic, initiative and innovation, and research progress. Each faculty member will have certain expectations. A final report, in which you analyze and discuss your research data may be required. Discuss the criteria for determining the final grade with the faculty member who will serve as your advisor, so that you are sure what will be expected of you.
5. Research Problems can only be taken twice. However, for students who demonstrated **exceptional** progress in their research, permission can be granted to take Research Problems for a 3rd semester. This 3rd semester must be used as an Elective (not a Biology Elective).

Summer Courses for Academic Credit in the Biology Curriculum:

Required Biology courses must be taken at CUA. Approval to take these courses elsewhere is granted only under exceptional conditions, and should not be expected. Other courses taken off-campus must be pre-approved for transfer if they are taken to fill a specific degree requirement. For information on this process, consult the Arts & Sciences, on-line, Advising Handbook: <https://arts-sciences.catholic.edu/academics/undergraduate-programs/advising-handbook/index.html> and this section in particular: <https://arts-sciences.catholic.edu/academics/undergraduate-programs/advising-handbook/formtransfereval.html>.

Study Abroad and the Biology Curriculum:

Biology majors do participate in CUA programs in other countries. Given the full, four-year, Biology curriculum that builds from semester to semester, however, study abroad requires very careful, advance planning. At this time none of the study abroad programs offer courses that will substitute for required biology courses, and only a few programs offer courses that can be used as biology electives. Therefore, participation in study abroad may require that the student obtain some credits through courses taken in the summer, or by over-electing (taking six instead of five courses in a given semester). Early consultation with your academic advisor is recommended if you wish to include study abroad in your program for graduation. It should be emphasized that Catholic University has specific requirements for participation in study abroad programs that must be met, and that not all applicants may be accepted in a given year.

Acceptance as a Biology Major:

Undergraduate students at CUA must be accepted into a major program by the end of their sophomore year of study. In addition to the requirements spelled out in the Undergraduate

Advising Handbook, each department or program has requirements that must be met for acceptance of a student as a major in that field. To be accepted as a major in the Department of Biology, a student should normally have completed four semesters of biology and four semesters of chemistry with a minimum science GPA of 2.5 and a minimum cumulative GPA of 2.0. In addition, all of these science courses must be completed with a minimum grade of C-. Any student who has not successfully completed all the required biology and chemistry courses at the end of the sophomore year may be permitted to continue in order to attempt to fulfill the requirements. The student will be evaluated at the end of each semester and must achieve minimum grades of C in the next required biology and chemistry courses. Students transferring to biology from another major, or who have been undecided majors, as well as students who are transferring from another institution, will be expected to have maintained the same grade point average, though course requirements may be modified and/or the timeline modified.

Senior Comprehensive Assessment:

CUA requires that all seniors undertake, and pass, some form of a Senior Comprehensive Assessment prior to graduation. The format for the comprehensive assessment is decided by each department or school. In the Department of Biology each senior student is given a specific, scientific topic in September, and then works in conjunction with a faculty advisor to explore the scientific literature on this topic in depth, and to use the information obtained to prepare a scholarly paper. This process continues until the end of February in the senior year.

Honors Track in Biology:

Students whose work is of high quality and who fulfill the set of requirements listed below will be invited to present an Honors research talk. Upon successful completion of the talk, they are awarded departmental honors. The Honors research presentations are given during the week after final examinations (Senior Week). Each talk lasts about 20 minutes and is followed by a discussion period during which faculty and students can ask questions about the research.

1. Students must achieve a GPA of 3.50 in all of their biology courses. The GPA will not be rounded up unless there are extenuating circumstances. A student may not receive a C grade or less in any of these courses. This means that a student who had to repeat a requirement because of a D or F in a major required course is excluded from honors.
2. Students must take two 500-level biology lecture elective courses from the offerings of the Biology Department or BIOL 418 plus one 500 level course. A 500-level course in the Chemistry, Biomedical Engineering, or Physics departments with a biological emphasis that fulfills a biology elective requirement is also acceptable. Research Problems (BIOL 493) does not fulfill this requirement.
3. A student must complete a significant amount of independent research. In general, this would mean completing two semesters of Research Problems or one semester of Research Problems and a summer of research in a faculty member's laboratory. The Department, however, reserves the right to modify this policy. Simply electing research problems for two semesters or doing research in the summer without progress does not entitle a student to honors. The research mentor must feel that the student's consistent progress merits recognition.

4. Oral presentation of the work accomplished in Research Problems. The presentation is given at the end of the spring semester of the senior year.
5. Successful completion of all other degree requirements, including the Senior Comprehensive Assessment.

Pre-Medical Advising Program:

Admission to medical school requires planning, determination, aptitude and suitable preparation. The number of applicants to medical school has increased, and competition remains intense.

The Pre-medical Program at CUA offers students a sound preparation for entrance into medical school. Students enjoy a wide choice of curricula in keeping with the requirements of most medical schools that applicants have a broad background in the liberal arts.

Traditionally, the pre-medical student at CUA has majored in biology, bio-chemistry, chemistry, psychology or biomedical engineering. CUA pre-medical students, however, may major in fields as diverse as English, music, and philosophy.

Questions should be directed to Ms. Marion Ficke (McW 212; 202-319-5870; ficke@cua.edu) who serves as the Pre-Medical Coordinator, and supervises the program.

For additional information about application to medical school, see <http://careers.cua.edu/gradinfo/MedSchool.cfm>

Biology Club:

The CUA Biology Club is an organization for all those interested in the life sciences. During the academic year the Biology Club organizes a combination of social and educational activities that provide opportunities for students to interact with invited guests, the faculty, and with each other. The club sponsors lecture series addressing current issues and other topics of interest, and provides members with opportunities to establish contacts with professionals in the life sciences.

A sampling of recent Club activities includes: welcoming party at the beginning of the academic year, career talks, lecture series and pre-med oriented programs.

Annual Biology Department Awards:

The Department of Biology presents two awards to graduating seniors each year.

1. Academic Excellence Award in Biology: This award is presented annually to graduating Biology major who has achieved an outstanding academic record in Biology and other course work, and in other scholarly activities. To be considered for the Academic Excellence Award a student must have a

minimum GPA of 3.5 in required Biology courses, as well as an overall GPA of 3.5. The Biology faculty strongly consider GPA in deciding to whom this award will be given, as well as a student's participation in laboratory research, performance in courses required for the Honors in Biology distinction, and demonstration of originality and analytical skills in Senior Seminar and the Senior Comprehensive Assessment.

2. Nils Steensen Award: This award is presented to the senior who has contributed to the activities of the Biology Club and to other functions which promote a spirit of unity and augment the academic welfare of the students in the Department. To be considered for the Steensen award a student must have achieved a minimum GPA of 3.00 in Biology courses, and 2.75 overall.

Letters of Recommendation:

Whatever you decide to do professionally after the completion of your baccalaureate degree, you will probably need letters of recommendation from some of the Biology faculty. One of the benefits of majoring in this Department is that students are well known to the faculty, and so you are recognized to be an actual individual who is part of the Department, rather than simply a student ID number and a grade-point average. Faculty will be pleased to write the best letter of recommendations for you that they can. That fact notwithstanding, there are guidelines that should be followed to make the letters-of-recommendation process successful.

1. If, after 3-plus years of majoring in Biology you have never asked a question in class, showed some definite interest in course subject matter, taken an active part in social and other events within the department, or had conversations with the members of the faculty, it will be hard for the faculty to write effective letters. A letter that can state only, "Ms. X always attended my class, took all the exams, received a solid grade of B, and never once asked a serious question or seemed genuinely interested in the material." will probably not much impress the reader. The preferable situation is to have created the situation so that a professor can write, "Ms. X was always actively engaged in the classroom, asking penetrating questions that showed she was thinking well beyond the material presented in lecture." Your active participation in all aspects of the educational process will increase your level of knowledge, enhance your sense of self-confidence, and greatly improve the quality of letters of recommendation that are written in support of your later efforts.
2. Faculty are busy people (No, they actually don't get the whole summer off - summer is a time when they are working hard to accomplish research and write scientific papers). A good letter of recommendation takes time to write. Give the faculty as much lead time as possible before a letter of recommendation is due; a *minimum* of four weeks is a reasonable guideline. Asking for a letter that is needed in two days' time will certainly not make a favorable impression, and may well result in a letter not being sent, or a letter of lower quality than one written with more time for thought and organization. In particular, December is not a good time to request letters.
3. Provide a resumé, C.V., or other source of supplemental information about

yourself. The faculty know how you did in their classes, and have experience interacting with you in other venues at CUA, but letters of recommendation are much more effective if the writer has a broader knowledge of your interests and accomplishments. Provide such information when you request a letter, and so provide the faculty the opportunity to do the best job for you that they can.

4. Please understand that different faculty have different requirements for writing you a letter. Some will want to meet with you in person to discuss your qualifications for the opportunity. Others may ask you to write a cover letter to them about what you are applying for and how you have demonstrated that you are a good fit. You need to leave enough time to meet these requirements and know that a simple email request may not be sufficient.

The Minor in Biology

To minor in Biology students must successfully complete a six-course sequence that consists of the following:

1. Required, Core Courses (2):
Introductory Biology: Biol. 105/115 and 106/116
2. Elective Courses (4):
The three elective courses may be selected from the list below. Some courses may have prerequisites.

Biol. 232 and 233	Human Anatomy and Physiology
Biol. 307	Genetics
Biol. 418	Physiology
Biol. 449	General Microbiology
Biol. 454	Biochemistry
Biol. 555	Rational Drug Design
Biol. 559	Cell Structure and Function
Biol. 563	Developmental Biology
Biol. 565	Model Organisms and Human Disease
Biol. 566	Immunology
Biol. 574	Viruses and Vaccines
Biol. 579	Principles and Practice of Biotechnology
Biol. 580	Entrepreneurial Biotechnology
Biol. 581	Essentials of Biotechnology Project Management
Biol. 583	Regulatory Processes for Domestic and Global Biotechnology
Biol. 586	Molecular Genetics and Recombinant DNA
Biol. 596	Computational Genomics
Biol. 597	Fundamentals of Statistics in Biology, Medicine and Biotechnology
Biol. 598	Membrane Trafficking and Disease
Biol. 599	Signal Transduction and Biomembranes

In addition to this list of electives, it may be possible to substitute other courses, provided that they are officially approved by the Department of Biology. Students seeking such approval should submit a request by email to Ms. Ficke (ficke@cua.edu), providing the name and number

of the course, the school at which it is to be taken, a catalog description of the course, and a copy of the syllabus. The student should also stipulate the reason for wishing to substitute this course for one of the standard biology electives.

Campus Resources

<u>Math Center:</u>	Mullen Library, Second Floor 202-319-5655 https://success.catholic.edu/academic-support/math-center/index.html
<u>Center for Academic & Career Success:</u>	102 McMahon; Tel: 202-319-6262 success@cua.edu https://success.catholic.edu/
<u>Tutoring Services:</u>	Mullen Library, Second Floor; Tel: 202-319-5655 cua-tutoring@cua.edu https://success.catholic.edu/academic-support/tutoring-services/index.html
<u>Technology Services</u>	Self-Help / Ticket Submission Website: techsupport.catholic.edu Email: techsupport@cua.edu Service Desk Location & Hours Phone: 202-319-4357 (xHELP) Walk-in: 117 Leahy Hall Monday - Friday, 7:00am - 7:00pm https://technology.catholic.edu/
<u>Counseling Center:</u>	127 O'Boyle Hall; Tel: 202-319-5765 http://counseling.cua.edu/ Facebook: @CatholicUCounselingCenter Twitter: @CUACounseling Instagram: @catholicucounseling
<u>Disability Support Services:</u>	127 Pryzbyla Center; Tel: 202-319-5211 https://dss.catholic.edu/index.html CUA-DSS@cua.edu
<u>Writing Center:</u>	219 Mullen; Tel: 202-319-4286 https://success.catholic.edu/academic-support/writing-center/index.html

APPENDIX: Use this tool to informally keep track of your completed coursework*.

Biology (B.S.) Tracking Tool -- New Curriculum		# of credits needed	# of credits taken		# of credits needed	# of credits taken
Major Courses			Liberal Arts Curriculum			
1	BIOL-105	3		29	Classical Philosophy (LC)	3
2	BIOL-106	3		30	Modern Philosophy (LC)	3
3	BIOL-217	3		31	Foundations in Theology I (LC)	3
4	BIOL-317	4		32	Foundations in Theology II	3
5	BIOL-307	3		33	Rhetoric and Composition (LC)	3
6	BIOL-454	3			<i>Foundations of Mathematics</i>	X X
7	BIOL-449	4			<i>Foundations in Natural Science</i>	X X
8	BIOL-452	3		34	Explorations in Literature	3
9	BIOL-418, BIOL-538, BIOL-540, BIOL-544, BIOL-555, BIOL-559, BIOL-563, BIOL-565, BIOL-566, BIOL-572, BIOL-574, BIOL-584, BIOL-586, BIOL-596, BIOL-597, BIOL-598, BIOL-599	3				
10	BIOL-4/BIOL-5	3		35	Explorations in Fine Arts	3
11	BIOL-4/BIOL-5	3		36	Foundations Social Science	3
12	BIOL-4/BIOL-5	3		37	Philosophy elective course	3
	Science Concentration			38	Theology elective course	3
13	MATH-111/MATH-121	3		39	Foundations in History/Politics	3
14	MATH-112/MATH-122	3		40	Intermediate Language I*	3
15	PHYS-205/PHYS-215	4		41	Intermediate Language II*	3
16	PHYS-206/PHYS-216	4		Electives		
17	CHEM-103	3		42		3
18	CHEM-104	3		43		3
19	CHEM-203	3		44		3
20	CHEM-204	3		45		3
	Required Labs			46		3
21	BIOL-115	2		47		3
22	BIOL-116	2		48		3
23	PHYS-225	1				
24	PHYS-226	1		Subtotal Credits Column 2		60
25	CHEM-113	2				
26	CHEM-114	2		TOTAL		138
27	CHEM-213	2				
28	CHEM-214	2		*Note-if you test out of a language, these two lines become electives (any 3-credit course);		
	Subtotal Credits Column 1	78	0	AP credit can fulfill the requirement		
	# Credits left to take in column 1		78	# Credits left to take in column 2		60
				# Credits left in TOTAL		138

*download a fillable copy here:

<https://docs.google.com/spreadsheets/d/1xh0I6Z3NUsK0cIwFOCWvCwIM0U68gN7T/edit?usp=sharing&oid=106775104888394986935&rtpof=true&sd=true>