

PROPOSAL FOR A CERTIFICATE PROGRAM

Date: January 22, 2023

College: Franklin College of Arts and Sciences

Department: Cellular Biology

Certificate Title: Undergraduate Certificate in Immunology

Effective Term: Fall 2023

Which campus(es) will offer this certificate? Athens

Level: Undergraduate

CIP: 26040101

Program Abstract

The Department of Cellular Biology is proposing a new *Undergraduate Certificate in Immunology*. The field of immunology is at the foundation of modern medicine. An increasing understanding of the inner workings of our immune system has enabled us to combat infectious and non-infectious diseases alike, starting from as early as the 19th century. Immunological breakthroughs have led the way to the successful development of vaccines and immunotherapies to treat allergies, autoimmune disorders, and cancers. Nevertheless, the SARS-CoV2 pandemic response revealed a surprising, but tangible knowledge gap in our understanding of immunity in the context of public health, disease treatment, and prevention. Communication between scientists, physicians, and policymakers was at times ineffective, and strained with abundant misinformation, leading to public confusion regarding important healthcare decisions. In addition to being thrust to the forefront of public health and policy, immunology was also the subject of many political debates. It is important that we have an informed citizenry who can understand immunology and draw scientifically sound conclusions based on available research data.

The *Undergraduate Certificate in Immunology* recognizes students that understand the core tenets of immunology in the context of health and disease, and can evaluate and communicate research in immunology. This certificate would be useful for undergraduate students in any of the biological science majors with an interest in a career in medicine, biomedical research, public health, or policy, in either the public or private sector. In addition to the value our core courses bring to the certificate recipients, the elective choices carry added value by

emphasizing skills relevant to preparing students to be good researchers and communicators. For this reason, the certificate would be appealing to students pursuing careers in science policy, health communication, healthcare management etc. The 12 credits of courses required for the certificate must be taken for a grade, and a minimum grade of “C” is mandatory for all classes taken in fulfillment of the certificate.

1. Purpose and Educational Objectives

State the purpose and educational objectives of the program. How does this program complement the mission of the institution?

The objectives of the *Undergraduate Certificate in Immunology* are to:

1. Provide a basic knowledge of immunology and its application in relation to human health and disease
2. Develop an ability to critically evaluate and communicate research in immunology
3. Prepare the certificate bearers for a professional career in medicine and make them attractive to the degree granting institutions in such fields (e.g., medical, dental, physician assistant, nursing or public health schools)
4. Create a knowledgeable workforce for local and regional employers (CDC, USDA, various biotech companies (e.g., Boehringer Ingelheim in Athens), non-profit organizations, and news agencies.

The proposed *Undergraduate Certificate in Immunology* program is committed to creating a new crop of graduates who would advance the central mission of the University of Georgia to ‘teach, serve, and inquire into the nature of things’. While the core courses in immunology, infectious diseases and cancer biology would facilitate understanding the fundamental concepts of immunology in the context of diseases and equip the students to interrogate cutting-edge scientific literature, the elective courses would train them to present, communicate, and disseminate this knowledge effectively.

2. Need for the Program

Explain why this program is necessary. In addition, provide the following information:

- a. Semester/Year of Program Initiation:** Fall 2023
- b. Semester/Year of Full Implementation of Program:** Fall 2023
- c. Semester/Year First Certificates will be awarded:** Spring 2024

d. Annual Number of Graduates expected (once the program is established): 40-50

e. Projected Future Trends for number of students enrolled in the program: 40-50

Perturbations of the immune system regulate the balance between health and disease. Dysregulation of the immune system has not only been implicated in cancer, autoimmunity, and asthma, but also in neurological diseases such as Alzheimer's and autism. Emergence of novel infectious diseases also remains a concern for immunologists, along with the urgent need to develop the next generation of treatments and vaccines against elusive pathogens such as influenza and HIV, or the neglected diseases such as malaria or tuberculosis. The development of novel, effective strategies to combat such diseases require a basic understanding of immunology and the disease process. Core competencies acquired from the elective portion of this certificate program are necessary for students to gain critical insights from scientific data and engage the public in understanding these insights. These are important skills for researchers, physicians, other healthcare workers, science/ public health advocates, and journalists. It is noteworthy that the W-suffix electives are writing intensive courses and also count for credit toward the UGA Writing Certificate Program.

Teaching and research in immunology is a core strength of UGA and in the Department of Cellular Biology. The immunology course which is at the core of this certificate program originated in, and continues to be, offered by the Department of Cellular Biology. The course directors, who are Cellular Biology faculty, evaluate, innovate, and implement novel learning strategies to deliver a curriculum that meets students' needs and learning outcomes. One example is the breakout sessions added to the course curriculum that help students appreciate the broad applications of immunology to healthcare and research, and facilitate critical reading and discussion of studies in immunology. Considering the decades of experience developing and teaching immunology course at the undergraduate and graduate levels, the Department of Cellular Biology is the ideal home for an *Undergraduate Certificate in Immunology* program.

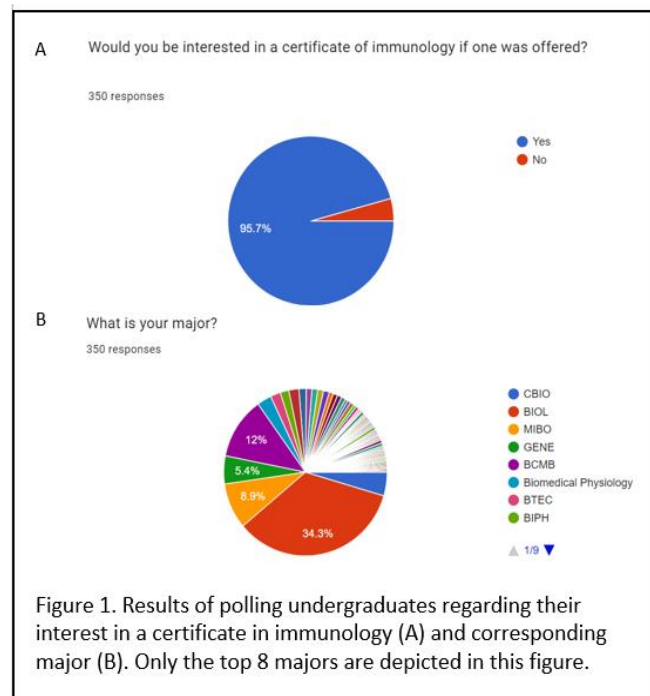
It is anticipated that the certificate will be offered beginning the fall semester of 2023, with the first certificates potentially awarded in the spring semester of 2024. Our preliminary survey found immense interest in the proposed program among currently enrolled students across a broad range of majors. The department expects 40-50 students to obtain the certificate each year once the program is established and to be a key component of the University of Georgia's commitment to public education and training.

3. Student Demand

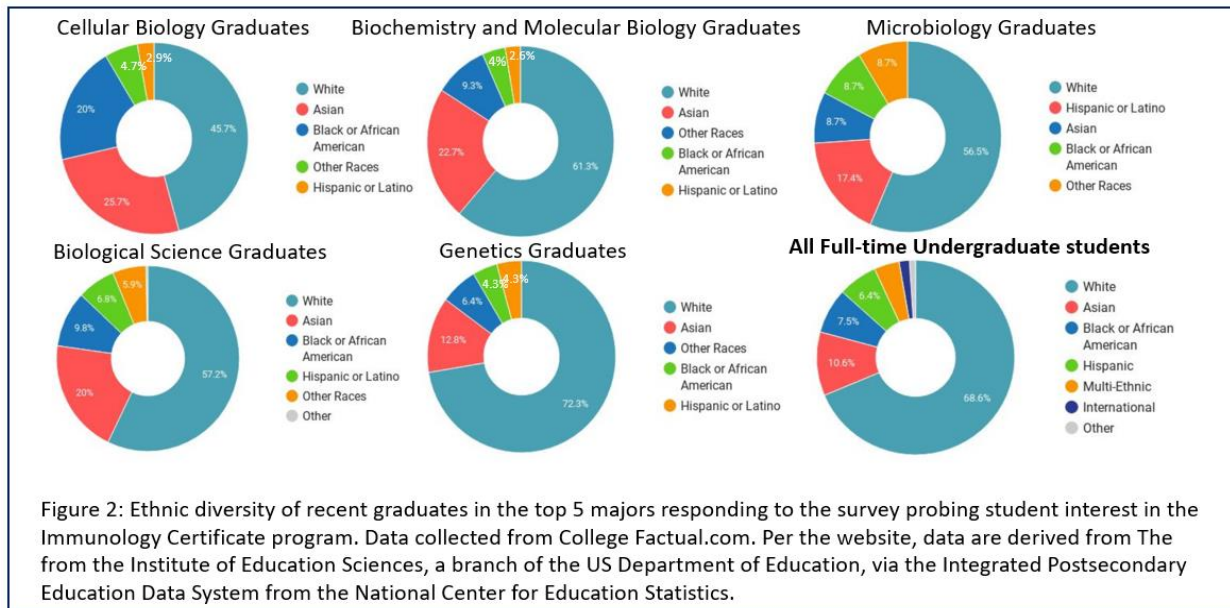
- Provide documentation of evidence of student demand for this program.
- Provide evidence that demand will be sufficient to sustain reasonable enrollment.
- To what extent will minority student enrollments be greater than, less than, or equivalent to the proportion of minority students in the total student body?

In January of 2023, the Department of Cellular Biology surveyed undergraduate students, irrespective of minors, for interest in an *Undergraduate Certificate in Immunology*, through the Franklin College of Arts and Sciences advising newsletter and various biological science advisor listservs. A total of 350 responses were received over a period of 5 days. An overwhelming majority (95.7%) of the total recipients responded that they would be interested in attaining such a certificate in immunology (**Figure 1A**). Approximately 65% of the survey respondents were, in our estimation, the major target 'demographic' for the certificate program- students majoring in Biology, Microbiology, Genetics, Biochemistry and Molecular Biology, or Cellular Biology (**Figure 1B**). Among these majors, the interest in the course was an overwhelming 97%. The rest of the respondents included students majoring in Pharmaceutical Sciences, Biological Engineering, Biomedical Physiology, Health Promotion (Public Health), and Exercise and Sports Medicine. These data suggested a very high demand for this certificate.

Diversity among majors in the biological sciences varies, with some majors more or less diverse than the entire full-time undergraduate student body (**Figure 2**, next page). For example, the representation of Black or African American and Hispanic or Latino students in the graduating classes of Biology, Microbiology, and Cellular Biology majors are 16.6%, 26.1%, and 22.9%. The representation of similar students is 6.6% and 8.6% among Biochemistry and Molecular Biology and Genetics majors, respectively. The average representation of Black or African American and Hispanic or Latino students among all five of these specific majors, who responded positively to the survey



probing student interest in the Immunology Certificate program is 16.16%, which is higher than their representation among all full-time undergraduate students (13.9%). Thus, we anticipate the



minority student enrollment in the Immunology Certificate program will be greater than the proportion of minority students in the total student body. Of note, this will depend on the specific majors that chose to participate in the certificate program. Better data can be acquired after program launch and will be monitored by the Cellular Biology Department in the exit questionnaire.

4. Program of Study

Provide a detailed program of study for the certificate program, including:

- Specific course prefixes, numbers, and titles
- Identify any new courses created for this program

Students must complete three required courses and one elective course for a minimum of 12 credit hours.

Required Core Courses (9 hours)

- CBIO 4100/6100 Immunology (4 Credit hours, Spring, Fall)
- CBIO 3150 Special Topics in Cellular Biology (will be used in conjunction with Research seminars (2 Credit hours, Spring, Fall)

One of the following:

- MIBO 4650 Introduction to virology (3 Credit hours, Fall), **OR** CBIO 4500 Medical parasitology (3 Credit hours, Spring), **OR** MIBO 4220/ 4220S Pathogenic Bacteriology (3 Credit hours, Spring), **OR** MIBO 4700 Medical Mycology (3 Credit hours, Spring) **OR** PHRM 4000 The War on Cancer.

Elective Courses (3 hours)

Choose one course:

- STAT 3110/E Introduction to Statistics for Life Sciences (3 Credit hours, Fall, Spring, or Summer)
- BIOL 4200W Science and Health Writing (3 Credit hours, Fall or Spring)
- BIOL 4300W Scientific Research Writing (3 Credit hours, Fall or Spring)
- HPRB 5310/E Introduction to Public Health Communication (3 Credit hours, Spring)

5. Model Program and Accreditation

a. Identify any model programs, accepted disciplinary standards, and accepted curricular practices against which the proposed program could be judged. Evaluate the extent to which the proposed curriculum is consistent with these external points of reference and provide a rationale for significant inconsistencies and differences that may exist.

b. If program accreditation is available, provide an analysis of the ability of the program to satisfy the curricular standards of such specialized accreditation.

There are very few undergraduate certificate programs in immunology currently in the United States. Therefore, there are no models against which the proposed certificate program can be fairly evaluated. While there are several programs that offer degrees with an emphasis/ major in immunology, these are not undergraduate certificates in immunology that are awarded in addition to a major. The following are the certificate programs that are close to what is proposed here:

[Certificate in Immunology, Harvard Medical School](#) (Online)

[Graduate Certificate in Microbiology and Immunology, University of Arizona](#)

[Undergraduate Certificate in Immunology, University of Cambridge, UK](#)

Clearly, there are no similar undergraduate certificates in immunology targeted at currently enrolled students at a University in the United States that we could find. Therefore, we believe that the proposed program will be the benchmark for such certificate programs. We anticipate the

proposed certificate program to also evolve to a graduate certificate program in immunology or advanced certificate programs eligible for continuing education credits for professionals in the future, potentially broadening the impact of the University of Georgia in the realm of public education.

6. Student Learning Outcomes

Describe the proposed learning outcomes for the certificate program.

Upon completion of the certificate curriculum, students should demonstrate an understanding of:

- The components of the immune system and the complex interactions between these components in initiating & regulating immune responses,
- Immune defense mechanisms against infectious diseases & cancers; 21st century vaccines and immunotherapies,
- The consequences of a malfunctioning immune response,
- Modern research techniques in immunology,
- Current challenges, approaches, and recent breakthroughs in immunological research via reading and discussing primary research papers and attending relevant seminars,
- How to critically evaluate immunology research and formulate novel research questions
- How to communicate immunology and related scientific research.

7. Assessment of Student Learning Outcomes

Describe how the learning outcomes for the program will be assessed. Describe the process and criteria for how students will be admitted to and retained in the program.

The certificate is open to any student of any major. To complete the certificate, students must earn a “C” or better in all certificate courses, and complete a ‘final learning outcomes’ exit questionnaire.

Assessment of student learning outcomes will be addressed through the following:

1. Many of the required courses considered for the certificate have learning objectives aligned with those proposed in section 6 for the certificate. For example, students in CBIO 4100/6100 are required to write a novel immunology-based research plan. Students attend seminars and submit summaries and opinions on the research as part of the CBIO 3150 course. Data analysis is part of immunology breakouts and STAT 3010. Thus, outcomes can be cumulatively assessed via individual course grades. Students must receive a passing grade of “C” or better in all courses

counted toward the certificate. The elective courses selected for the students both complement and expand important competencies for a budding scientist.

2. Students completing the coursework for the certificate will be asked to complete a questionnaire developed by immunology faculty in the department to assess student knowledge in some of the areas discussed above

Please submit documentation of the following approvals with the proposal:

- **Department Head/Director**
- **Dean/Vice President**
- **Heads of any academic units which offer courses used in the program of study**
- **Heads of any academic units which offer similar programs**

Approval Signatures:

Head, Department of Cellular Biology

Head, Department of Pharmaceutical Sciences

Head, Department of Microbiology

Head, Division of Biosciences

Head, Department of Statistics

Head, Department of Health Promotion and Behavior

Dean, Franklin College of Arts and Sciences

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Approval Signatures:

Dennis Kyle Digitally signed by Dennis Kyle
Date: 2023.01.23 12:28:27
-0500

Head, Department of Cellular Biology



**Head, Department of Pharmaceutical and
Biomedical Sciences**

Head, Department of Microbiology

Head, Division of Biosciences

Head, Department of Statistics

**Head, Department of Health Promotion &
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Dean, Franklin College of Arts and Sciences

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Aaron Mitchell 1/23/2023

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Dennis Kyle Digitally signed by Dennis Kyle
Date: 2023.01.23 12:26:27
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Head, Department of Cellular Biology

**Head, Department of Pharmaceutical and
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Kristen R Miller 1/23/23

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Head, Division of Biosciences

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Dean, Franklin College of Arts and Sciences