Proposal to create a concentration area in Immunology within the Comparative Biomedical Sciences graduate program

Submitted by: Dr. Scott Laster (Immunology Program Director) and Sam Jones (Comparative Biomedical Sciences Program Director)

Justification

The Comparative Biomedical Sciences (CBS) Program has been successfully training graduate students in basic and applied biomedical sciences for nearly two decades. The Program is organized into several concentration areas including infectious disease, cell biology, pathology, pharmacology, and population medicine. At this time the CBS program is requesting to establish a new concentration area offering a Ph.D. degree in the discipline of Immunology. This concentration will replace the previously independent Graduate Program in Immunology Ph.D. degree program. This request is made with the full knowledge and agreement of the Immunology Program faculty and DGP. The Immunology faculty members feel that the small size of the Immunology Program limits their success and that many more opportunities and resources will be available to them as a concentration within the CBS program. We also feel that the multidisciplinary nature of the CBS program will enhance the educational and research training experience for students in the immunology concentration area. We anticipate that the Immunology concentration area will ultimately enroll 10 full time Ph.D. students and that 2-3 students will graduate annually from this concentration. Based on the placement success of students from the Immunology Program we are sure that the placement rate of graduates from the Immunology concentration will be very high. Immunologists are in demand at virtually all medical, veterinary, and dental schools. Immunologists can also find employment at universities offering advanced graduate degrees in the life sciences and at many government agencies such as the National Institutes of Health, the Centers for Disease Control and the Environmental Protection Agency. Immunologists are also in strong demand in the biomedical industry, especially in North Carolina. The Research Triangle, for example, has become a center for companies that produce vaccines and therapeutic monoclonal antibodies, two technologies that rely heavily on employees with strong training in immunology. The Immunology Graduate Program produced graduates at this rate for nearly two decades, all of whom have gone on to strong professional careers. The M.S. in Immunology and the Master of Immunology degree programs offered by the Immunology Program will not be replaced and students interested in this degree program will be encouraged to enroll in either CBS or Master degree programs that utilize elective courses that align their degrees with their interest in immunology.

Description

Students who enter the CBS Program take a common set of core courses during their first year (CBS 565, Introduction to Comparative Biomedical Sciences, CBS 800, Comparative Biomedical Sciences Seminar, ST 511, Experimental Statistics for Biological Sciences, and CBS 662, Professional Conduct in Biomedical Sciences) and discipline specific courses required in their concentration area. The current Immunology requirements will be merged with the CBS core courses to create an immunology concentration area curriculum. Students who
select the Immunology concentration will find the entire suite of courses previously offered by the independent Immunology Program. Students will begin their training in immunology by enrolling in IMM (MB) 751 Immunology. This course has been taught by Dr. Scott Laster for over 20 years and presents a comprehensive, state of knowledge survey of immunology. Students will then have the option of choosing from two immunology electives including; IMM (PO) 757 Comparative Immunology and IMM (MB) 783 Advanced Immunology; taught by Drs. Koci and Tonkonogy, respectively. Both of these courses are taught almost exclusively from the current scientific literature and integrate both oral and written assignments with traditional didactic lectures. Finally, Immunology concentration students will be required to enroll in IMM (CBS) 816 Advanced Topics in Immunology (Immunology Journal Club) each semester, a team taught course with a rotation of organizing faculty. This course is taught entirely from the scientific literature with the students carrying the responsibility for critiquing current research papers. As a result, students get extensive presentation experience, in addition to learning how to read the immunological literature.

Objectives

The objectives of the concentration in Immunology are:

1. To train students in the discipline of immunology and closely related fields of study.

2. To train students in the scientific method so they will be able to carry out basic and applied research.

3. To enable students to critically evaluate the immunological literature.

4. To train students in grant writing so they will be able to compete successfully for research funding.

5. To train students in scientific publication so they will be able to effectively communicate their research results.

6. To enhance student verbal communication skills so they will be able to effectively deliver research presentations for conferences or job interviews.

Enrollment History

The enrollment history for the Immunology Program (Ph.D. only) for the past 5 years is shown in Table 1. The decline in enrollment in recent years stems largely from faculty retirements and reduced levels of extramural support. Table 1 also projects a modest rise in enrollment for the Immunology concentration during the next four year period as current junior faculty gain extramural funding and replacement hires arrive on campus. The CBS program has had on average 3 students who would likely be in the immunology concentration area (working with faculty advisors who are also members of the Immunology graduate program) if it existed over the past 5 years. Three students who will likely be members of the Immunology concentration area have accepts offers of admission to the CBS program and will matriculate in the fall of 2013. The enrollment estimates projected over the next 5 years are likely conservative.
Table 1. Enrollment History and Projections: Future enrollment is based on the number of students now enrolled in the Immunology program plus those who currently are enrolled CBS who we expect to join the Immunology concentration area plus those we expect to admit per year to CBS who we expect to choose the Immunology concentration area. This is based on current numbers of students and applicants and likely is conservative since we expect the number of students who apply to CBS who are interested in Immunology to increase.

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Other Programs

As mentioned above, the concentration in Immunology within the CBS program will replace the independent Immunology Program. This plan has emerged following extensive discussions with the current Immunology faculty, the DGP’s of Immunology and CBS programs, and the Associate Deans for Academic Programs from the College of Agriculture and Life Sciences, College of Veterinary Medicine and College of Sciences. The overwhelming sentiment from these discussions is that the movement of Immunology from an independent program to a concentration within CBS will have strong positive impact on the discipline of Immunology on the NCSU campus. Immunology program faculty and students will gain access to funding associated with the CBS program, to the CBS suite of courses, the CBS administrative structure, and ultimately, the interaction between the Immunology faculty and the other faculty in CBS should result in funded, extramural training grants.

Concentration Requirements: 27 credits total (not including research credits) for a PhD

CBS Core Courses Required of all Students:

- CBS 565 Fundamentals of Comparative Biomedical Sciences (3 credits)
- ST 511 Experimental Statistics for Biological Sciences (3 credits)
- CBS 662 Responsible Conduct of Research (1 credit)
- CBS 800 Seminar in Comparative Biomedical Sciences (1 credit; minimum 3 credits total for doctoral students; minimum 2 credits total for master’s students)

Courses Required for the Immunology Concentration:

(Note: if this proposal is approved, all IMM courses will be changed to or cross listed as CBS courses):

- MB/IMM 751 Immunology (3 credits)
- PO/IMM 757 Comparative Immunology (3 credits) or IMM/CBS 783 Advanced Immunology (3 credits)
- BCH 553 Biochemistry of Gene Expression (3 credits)
- IMM/CBS 816 Advanced topics in Immunology (1 credit; 8 credits required for doctoral students)
Additional Immunology Courses:
- IMM(CBS) 807 Seminar in Veterinary Microbiology/ Immunology

Elective Courses:
Elective courses are selected by the student and mentor, and must be approved by the student's graduate advisory committee. Possible elective course include, but are not limited to, the following:
- BCH 701 Macromolecular Structure
- BCH 703 Macromolecular Synthesis and Regulation
- BCH 705 Molecular Biology of the Cell
- BIT 810 Biotechnology Core Technology
- GN 701 Molecular Genetics
- GN 702 Cellular and Developmental Genetics
- GN 761 Advanced Molecular Biology of the Cell
- GN 710 Eukaryotic Regulatory Mechanisms
- GN 750 Developmental Genetics
- GN/MB 758 Prokaryotic Molecular Genetics
- GN/BCH 768 Nucleic Acids: Structure and Function
- GS 735 Introduction to Genomic Science
- CBS 770 Cell Biology
- MB 535 Bacterial Pathogenesis
- CBS 861 Bacterial Pathogenic Mechanisms
- CBS/IMM/MB 783 Advanced Immunology
- CBS/IMM 816 Advanced Topics in Immunology and Biotechnology
- MB 718 Introductory Virology
- ST 701 Experimental Statistics II
- TOX 501 General Toxicology

Faculty
The list below includes Faculty who are currently members of the Immunology Program or are on the list of Immunology faculty who are not members of CBS and will be added to the CBS program for the purposes of establishing the concentration in immunology.

- College of Veterinary Medicine
  - Petra Bizikova, Assistant Professor, Department of Clinical Sciences
  - Edward Havell, Professor, Department of Population Health and Pathobiology
  - Mary Tompkins, Professor, Department of Population Health and Pathobiology
  - Sue Tonkonogy, Associate Professor, Department of Population Health and Pathobiology

- College of Sciences
  - Frank Sholle, Associate Professor, Department of Biological Sciences
  - Jennifer Miller, Assistant Professor, Department of Biological Sciences
The list below includes current members of CBS who will join the Immunology concentration area. This list includes current CBS members who are also members of the Immunology graduate program or participate in Immunology program training (denoted by an *) and CBS members active in research areas that overlap with the immunology discipline and would meet the training needs of students interested in the immunology concentration area (denoted by a **). This will expand the thesis lab choices for students interested in immunology and enhance the interdisciplinary training opportunities for these and other CBS students.

- *Scott Laster, Professor, Department of Microbiology. Full member of graduate faculty.
- **Jody Gookin, Associate Professor, Department of Clinical Sciences. Full member of graduate faculty.
- *Sam Jones, Professor and Director of Graduate Program, Department of Clinical Sciences. Full member of graduate faculty.
- *Thierry Olivry, Professor, Department of Clinical Sciences. Full member of graduate faculty.
- **Adam Moeser, Assistant Professor, Department of Population Health and Pathobiology. Full member of graduate faculty.
- *Barbara Sherry, Professor, Department of Molecular Biomedical Sciences. Full member of graduate faculty.
- *Ed Breitschwerdt, Professor, Department of Clinical Sciences. Full member of graduate faculty.
- *Adam Birkenheuer, Associate Professor, Department of Clinical Sciences. Full member of graduate faculty.
- *Paul Hess, Assistant Professor, Department of Clinical Sciences. Full member of graduate faculty.
- *Jeff Yoder, Associate Professor, Department of Molecular Biomedical Sciences. Full member of graduate faculty.
- *Shila Nordone, Research Assistant Professor, Department of Molecular Biomedical Sciences. Associate member of graduate faculty.
- **Isabel Gimeno, Associate Professor, Department of Population Health and Pathobiology. Associate member of graduate faculty.
• *Bruce Hammerberg, Professor, Department of Population Health and Pathobiology. Full member of graduate faculty.
• *Mike Levy, Professor, Department of Population Health and Pathobiology. Full member of graduate faculty.
• *Jonathan Fogle, Assistant Professor, Department of Population Health and Pathobiology. Associate member of graduate faculty.
• *Lola Hudson, Professor, Department of Population Health and Pathobiology. Associate member of graduate faculty.
• *Steve Suter, Associate Professor, Department of Clinical Sciences. Associate member of graduate faculty.

Budget

We do not anticipate any new budgetary needs for this action.

Administration

The new concentration in Immunology will be administered by the CBS program utilizing existing personnel and procedures.
Proposal to create a concentration area in Immunology within the Comparative Biomedical Sciences graduate program
North Carolina State University

This request has been reviewed and approved by the appropriate campus committees and authorities.

Endorsed By:

Samuel L. Jones

6/4/2013
Head, Department/Director of Graduate Program

Recommended By:

Samuel L. Jones

6/4/2013
Chair, College Graduate Studies Committee

Endorsed By:

David Paul Lunn

6/10/13
College Dean

Approved By:

Dean of the Graduate School

Recommended By:

Dean’s Council

Approved By:

Provost

Approved By: