Date: January 27, 2014

To: Steve Sarratore  
   Associate Vice Chancellor for Academic Programs

From: Carl N. Drummond, Dean

Subj: New COAS-Approved Biology Concentration:  
      **Concentration in Microbiology and Immunology**

The Curriculum Committee of the College of Arts and Sciences has reviewed and approved a new Concentration in Biology at their meeting today. Attached you will find documentation (hard copies and email copies being sent).

This new Concentration is being sent to you for the initiation of the remaining steps beyond the college level.

CND/kb

cc: COAS Curriculum Committee  
   Frank Paladino, Chair, Department of Biology
Pre-Proposal for a Concentration in Microbiology and Immunology
Indiana University-Purdue University, Fort Wayne
*Tanya Soule, Ph.D., Department of Biology*
*Shree Dhawale, Ph.D., Department of Biology*
*Elliott Blumenthal, Ph.D., Department of Biology*

1. **Name of Proposed New Program:**
   Bachelor of Science in Biology with a concentration in Microbiology and Immunology

2. **Title of Degree to be Conferred:**
   Bachelor of Science

3. **Field of Study, Department, and School Involved:**
   Microbiology and Immunology, Department of Biology, COAS

4. **Proposed Date of Initiation of the New Program:**
   Fall 2014

5. **Rationale and Objectives:**
   Microbiology and immunology are broad areas of study with sub-disciplines in medicine, molecular biology, and environmental science. This program serves those students who plan to further their education in a professional program such as medical school or medical technology as well as those pursuing a graduate program in basic or applied research. Furthermore, this program will equip our students with the wet lab experience and knowledge that is crucial to many of the jobs in industry and public health.

   Relationship of the proposed program to the mission and scope of the campus:
   - **Department Mission:** The study of biology is expected to help students “prepare for careers in research, teaching, industry, government, medicine, medical technology, and several other health-related fields”. This concentration will provide students with the conceptual knowledge and wet-lab skills to enter one of the many career paths in biology where a background in microbiology and/or immunology is essential.
   - **College Mission:** As part of the College of Arts and Sciences, we must “equip students to think critically, communicate effectively, and develop creative solutions to future challenges”. A concentration in microbiology and immunology will inherently challenge students to develop creative solutions for future problems. Examples include problems associated with antibiotic resistance, disease transmission, or vaccine development.
   - **IPFW Mission:** IPFW strives to offer a “broad range of high-quality undergraduate, graduate, and continuing education programs”. By concentrating on a specific area in their program, such as microbiology and immunology, the quality of our graduates will
be enhanced, making IPFW and our students attractive to the community, future employers, and professional schools.

Relationship of the proposed program to already existing programs at the campus:

- Students currently interested in pursuing a specialization in microbiology and immunology in order to make themselves more attractive to professional schools and future employers must simply pick and choose those courses which seem to fit within their interest. This individual approach leaves room for students to miss out on opportunities to maximize their education and will not result in a degree that reflects their decision to specialize in this concentration.

Relationship of this program to similar programs in other regional and Indiana post-secondary educational institutions:

- Biology students at Purdue University, for example, can choose from either a general degree in Biology or up to eight areas of specialization. These areas are diverse and include options in Biochemistry, Biology Teaching, Cell, Molecular, and Developmental Biology, Ecology, Evolution, and Environmental Biology, Genetics, Health and Disease, Microbiology, and Neurobiology and Physiology. Furthermore, the Biology Department at Indiana University offers BS degrees in either Biology or Microbiology.

Cooperative endeavors explored and/or intended with other institutions particularly those located in the same geographic region:

- This concentration is very conducive to initiating cooperative interactions with other institutions within our geographical area. It will help train students in laboratory techniques that can be used by students as they help with research in the IU Medical School laboratories, and we will invite the Medical School Faculty to collaborate on research projects with the Biology Department. We already have interactions with Parkview Hospital’s Medical Technology program, and many of our students enter the MT program at Parkview. These students are required to take microbiology and immunology prior to admission to the MT program. Within the Fort Wayne community we have initiated and will continue to contact local businesses and offer our expertise. We have already interacted with local companies on both microbiological and immunological research that has helped them to grow, and we have been able to utilize their expertise as well.

Need for the concentration in terms of manpower supply and demand:

- According to [www.hoosierdata.in.gov](http://www.hoosierdata.in.gov) the statewide demand in the next five years for employment in the life, physical, and social science occupations is expected to increase by 16.2%. More specifically, for those students specializing in microbiology and immunology, jobs in microbiology should increase by 6.8%, food science by 19.0%, epidemiologists by 4.0%, and medical scientists by 28.8%. More broadly, the demand for biological technicians should increase by 12.4%
6. Course Requirements (Total 107 credits without free electives):

For the core curriculum, this concentration will require 93 credits composed of the core biology, math, statistic, chemistry, physics, and general education courses that are currently required for all biology majors. This also includes CHM 533: Biochemistry 1, as biochemistry integrates with many of the other required and elective courses in the concentration and students should have a firm understanding of biochemical principles.

For the concentration, 16 credits will be required. For eight of these credits, students will be required to take BIOL 437: General Microbiology and BIOL 537/565: Immunobiology, both of which have a lab component. The other eight credit hours will be chosen by the student from the list of approved electives; labs are not required, but may be taken, for these elective courses. Courses were chosen for their relationship to either immunobiology (i.e. BIOL 215) or to the three major areas of microbiology, which were identified as medical (i.e. BIOL 533), molecular (i.e. BIOL 509/584), and ecological (i.e. BIOL 524).

For the general education requirements, please refer to the following abbreviations:
A1: Foundational Intellectual Skills: Written Communication
A2: Foundational Intellectual Skills: Speaking and Listening
A3: Foundational Intellectual Skills: Quantitative Reasoning
B4: Ways of Knowing: Scientific
B5: Ways of Knowing: Social and Behavioral
B6: Ways of Knowing: Humanistic and Artistic
B7: Ways of Knowing: Interdisciplinary or Creative
C8: Capstone

Core Biology (22 credits: Required):
BIOL 117/119/217/218/219/491 (BIOL 491 also fulfills C8)

Core Math and Statistics (12 credits: Required):
MA 153/229(165) (these also fulfill A3), for an optional full year of calculus (MA 229 and 230)
STAT 240/340

Core Chemistry and Physics (27 credits: Required):
CHM 533: Introductory Biochemistry I is a requirement for this concentration
CHM 115/116/255/254/256/258/533 (CHM 115 also fulfills B4)
PHYS 220/221 (PHYS 220 also fulfills B4)

General Education (32 credits: Required):
A1. ENG W131 and W233
A2. COM 114
A3. MA 153 and MA 229
B4. CHM 115 and PHYS 220
B5. Choose at least one
B6. Choose at least one
B7. Foreign Language 111/112 level
C8. BIOL 491

COAS W233 (also fulfills A1)
Foreign Language 111/112 level (also fulfills B7)
Additional 9 credits from Category A or B
Microbiology and Immunology Concentration (8 credits: Required)

Shown as (semester/credits)
The following 2 lab courses are required; A/B structure will not be maintained
BIOL 437: General Microbiology (F/4)
BIOL 537 and 565: Immunobiology with Lab (S/4)

Microbiology Immunology Concentration (8 credits: Electives; choose from any of the following)

Shown as (semester/credits)
BIOL 533: Medical Microbiology (F/3)
BIOL 544: Virology (S/3)
BIOL 595: Emerging Infectious Diseases (F/3)- course number not yet assigned
BIOL 595: Insect-Vectorborne Diseases (F/3)- course number not yet assigned
BIOL 595: Protein Structure and Function (S/3)- course number not yet assigned
BIOL 520: Contemporary Parasitology (F/3)
BIOL 215: Basic Human Anatomy (F/3)
BIOL 516: Molecular Biology of Cancer (F/3)
BIOL 381: Cell Biology (F/3)
BIOL 506: Human Molecular Genetics (F/3)
BIOL 509/584: Molecular Biology and Applications with Lab (F/4)
BIOL 515: Molecular Genetics (frequency is unknown/3)
BIOL 540: Biotechnology (frequency is unknown/3)
BIOL 524: Bacterial Diversity and Systematics (S/3)
BIOL 543: Population Ecology with Lab (S/4)
BIOL 580: Evolution (F/3)

Microbiology Immunology Free Electives (n/a: Recommended Non-Biology Free Elective)
CHM 534: Introductory Biochemistry (S/3)
CHM 535: Introductory Biochemistry Lab (S/1)

7. 4-Year Plan:
* denotes a course with a lab component

Year 1: Fall 17
BIOL 117* 4
CHM 115* 4
ENG W131 3
MA 229 3
COM 114 3

Year 1: Spring 14
BIOL 119* 4
CHM 116* 4
ENG W233 3
GenEd B5 or B6 3
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<td>BIOL 217*</td>
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<td>CHM 255/254*</td>
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<td>BIOL 437*</td>
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<td>STAT 340</td>
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<td>PHYS 221*</td>
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<td>BIOL 537/565*</td>
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<td>BIOL elective 524/540/543*/544/595</td>
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<td>BIOL Elective 215/381/516/509/584*/533/580/595/520/506</td>
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<td>CHM 533</td>
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<td>BIOL 491</td>
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8. **Additional Resources:**

The department currently has the resources to support this proposed concentration.