SCHOOL OF INFORMATICS
INDIANA UNIVERSITY
IUPUI

Indiana University School of Informatics at IUPUI
Bioinformatics Program

Request for a PhD Minor in Informatics, Bioinformatics (BIO) Track

Approved by the BIO Program faculty on February 12, 2013
Approved by the School of Informatics Associate Dean for Research and Graduate Studies on February 14, 2013
Approved by the School of Informatics Executive Associate Dean on November February 14, 2013

1. Objectives of the PhD Minor

The aim of this Graduate Minor Program is to build the knowledge foundation of Bioinformatics methods and techniques to solve practical biological problems for current PhD students from other disciplines at IUPUI. This minor will assist graduate students with either biology, computer science or other basic science background to gain additional interdisciplinary training that is useful for the research in their own discipline.

2. Unique Features and Strengths of the Program

As IUPUI has been designated as Indiana University's life sciences campus, the proposed Graduate Minor will provide additional training for graduate students in multiple disciplines such as those in computer science who are interested in biological applications, those in biomedical sciences who need a deeper understanding of increasingly useful bioinformatics tools in biological research, and those in other computational and analytical sciences who want to expand the tools available for analyzing biological data. The Bioinformatics minor may also broaden knowledge skills for interested students in Health Informatics and HCI programs within the School of Informatics. Thus, the proposed Minor would strengthen existing strong ties between Bioinformatics programs and other academic schools within the School and across the campus.

3. The Target Audience

The proposed minor targets students at IUPUI seeking advanced degrees in Indiana University programs, such as Science, Medicine, and others. The Bioinformatics Program has received numerous inquiries from IUPUI Schools regarding the possibility of minors as part of their doctoral studies.

4. Plan for Sustaining Steady-state Enrollment

In the first year (Fall 2013), up to ten students will likely participate in the program. It is anticipated that this number will rise to twenty per year in the next three to five years, as the awareness of the program increases.

5. New Resources

No new resources are needed. All courses are currently taught at IUPUI by existing faculty.

6. Proposed Date of the Initiation of the Minor Program

Proposed date of implementation is Fall 2013, assuming all necessary approvals have been met.

7. Implementation Plan

Pending approval, the Bioinformatics program will begin accepting applications in every semester with a

rolling deadline for entering into the Graduate Minor program. The Department will inform the graduate program leaders of all IUPUI academic schools when the Minor is approved, and include information on application procedures and faculty contacts.

Upon receiving applications, the Bioinformatics Graduate Admission Committee will review them. The Graduate Admission Coordinator will notify the applicants of their status. Once applicants are approved, the student will be notified and Graduate Minor designation will be added to their student records so that it can be awarded upon completion.

Students will be assigned a Graduate Minor Advisor, who will be at least a 50% faculty member in the Bioinformatics program regarding minor requirements.

8. Persons Designated as the Graduate Minor Program Administrators:

Dr. Jake Chen, Associate Professor, School of Informatics, will be the Minor Program Coordinator.

Dr. Yaoqi Zhou, Professor and Director, Bioinformatics Program, School of Informatics, will provide the administrative oversight.

Dr. Xiaowen Liu, and Dr. Sarath Janga, Assistant Professors, Bioinformatics Program, School of Informatics, Dr. Huanmei Wu, Associate Professor, Bioinformatics Program, School of Informatics, will provide admissions assistance.

This Committee will periodically assess the minor program and its outcomes for students in line with accrediting standards.

9. Faculty Initially Involved in the Graduate Minor Program and their Credentials

Yaoqi Zhou

Ph.D., State University of New York at Stony Brook, 1990 Email address: yqzhou@iupui.edu 317-278-7674 *Personal Web Page:* http://sparks.informatics.iupui.edu. Dr. Zhou's research interests are in the areas of protein structure/function prediction, protein design and genome variations.

Jake Chen

PhD., University of Minnesota, 2001. Email address: jakechen@iupui.edu Tel: 317-278-7604 Personal Web Page: http://bio.informatics.iupui.edu Dr. Chen's research interests are development of computational tools to model complex biomolecular systems, particularly as they relate to disease, drug development, and human health.

Sarath Janga

Ph.D., MRC Laboratory of Molecular Biology & University of Cambridge, 2010 Email address: scjanga@iupui.edu 317-278-4147 *Personal Web Page:* http://www.iupui.edu/~jangalab. Dr. Janga's specific research interests are in the areas of genomics, genetic variation, regulatory networks and drug discovery with in the field of computational and systems biomedicine his lab works on.

Xiaowen Liu

Ph.D., City University of Hong Kong, 2008 Email address: xwliu@iupui.edu 317-278-7613 Personal Web Page: http://mypage.iu.edu/~xwliu/. Dr. Liu's research area is algorithmic biology. He designs algorithms in gene expression data analysis, mass spectrometry, and protein-protein interaction identification.

Huanmei Wu

Ph.D., Northeastern University, 2005 Email address: hw9@iupui.edu 317-278-1694 *Personal Web Page:* http://www.engr.iupui.edu/~hw9. Dr. Wu's research interests are database management, data mining, health information technology, image processing, signal processing, and cancer radiation treatment.

Mathew Palakal

Ph.D., Concordia University, 1987 Email address: mpalakal@iupui.edu *Personal Web Page*: http://www.cs.iupui.edu/~mpalakal 317-274-9735 The development of Artificial Neural Network (ANN) models as learning and decision-making systems for various AI-related problems are of primary interest. Dr. Palakal is involved in projects that include modeling Biosonar systems, neural network models to predict damages in materials and structures, and distributed information filtering. Dr. Palakal is now serving as Associate Dean for Research and Graduate Education in the Indiana University School of Informatics at IUPUI.

10. Admissions Requirements and Procedures

General Admission Requirements for the Graduate Minor in Bioinformatics

Students who are enrolled in any Indiana University or Purdue University doctoral program at IUPUI may apply for admission to the Bioinformatics Graduate Minor program. Students must submit an internal application to the Bioinformatics Program at School of Informatics for review. Admissions are done on a rolling basis.

Student Financial Support

It is expected that many of the students completing the Graduate Minor will have received funding from their academic department. School of Informatics does not generally offer departmental aid for students pursuing the minor.

Completion Requirements and Audit and Certification Procedures

Course Requirements

The proposed minor will require a coursework totaling 12 graduate credit hours. This includes the required INFO I519 (Introduction to Bioinformatics). Three other courses can be selected from INFO I573 (Programming for Chem/Life Science), INFO I556 (Biological Database Management), INFO I590 (High-throughput Data in Biology), INFO I590 (Next generation sequencing), INFO I529 (Machine Leaning in Bioinformatics), INFO I619 (Structural Bioinformatics), INFO I646 (Computational System Biology), and INFO I656 (Translational Bioinformatics Applications). Some of I590 topic courses may acquire permanent course numbers in the future.

11. Minimum Overall GPA

Successful completion of the minor certificate requires at least a B average over all courses counting toward the minor. The minimum grade that will be accepted in any single course is C. Course grades of C- and below must be repeated and a C or higher grade must be earned.

12. Maximum Number of Transferable Credits

Applicants who have already earned credit for one or more of the equivalent courses from other institutions and other programs may request to apply up to a maximum of three credits of these courses toward the minor. Any waivers or substitutions have to be approved by the Minor Coordinator in consultation with the Graduate Committee of the Computer and Information Science Department. A maximum of three credits from another institution may be applied toward the Graduate Minor.

13. Maximum Number of Allowable Undergraduate Courses

No undergraduate courses can be applied to the minor program.

14. Maximum Time for Completion

All requirements for the certificate must be completed within four years. Most students enrolled in this program will be full-time students, and should attempt the minor during the early part of their studies.

Number of Allowable Credit Hours taken Prior to Admission to the PhD Minor

Up to 6 equivalent credit hours taken prior to admission to the Graduate minor, including a maximum of 3 credit hours taken from another institution (B grade or higher, or equivalent, required in all 3 credits), will be counted towards the minor. The rest of the courses must be completed at IUPUI within a four-year period from the time of admission. In the case of a student with 3 equivalent transfer hours, 9 additional credit hours must be completed at IUPUI in order to earn the minor. The completion timeline stated above applies in both cases. If a student completes any combination of equivalent credit hours prior to admission and transfer credit hours, the student must complete the remaining number of credit hours at IUPUI, which will be no less than six.

15. Procedures for Governing the Program including Construction of Committees that will Provide Oversight

The Graduate Curriculum Committee of the Bioinformatics Program will oversee the program. Qualifying exam is not required for PhD Minor in Bioinformatics but an exit interview will be conducted after the completion of the minor program. All advising will be done by these faculty members. The School of Informatics and the graduate admissions coordinator, will take responsibility for all record keeping and tracking of students.

16. Procedures for Program Evaluation including the Criteria for Success

Upon completion of the minor program, exit interviews by a faculty committee will be conducted for all students to determine the effectiveness of the program in meeting their needs and to identify how they are using the skills and tools learned in the program in their major areas of study. Follow-up interviews will be conducted after three and five years. Given the projected enrollment of this program, it is anticipated that

most students will be tracked in this manner. Success of the program will be defined in terms of demand (enrollment) and the responses of the students surveyed upon completion of their degree and in the follow-up interviews. To ensure completion of this important, final aspect of the feedback loop—ensuring the ongoing quality of the minor program offering and soliciting insight for future improvements, the school recorder will place an administrative hold on the student's record, pending notification from the program director that the interview has been completed.

17. Impact on Undergraduate and Graduate Programs

It is anticipated that the graduate minor would have no impact on undergraduate programs. The minor would be an option for graduate students in many fields, and would increase their options for doctoral minors. Some graduate programs have expressed particular interest in our Bioinformatics minor. It is anticipated that most students will originate from other academic schools. The School of Science (PhD in Biostatistics, PhD in Biology) is particularly interested in the graduate minor program.

18. Employment Possibilities for Graduates

The Bioinformatics Graduate Minor will add value to the portfolio of doctorate recipients by increasing their theoretical and analytical computing skills and allowing them to apply this knowledge to their specialization of study. It is expected that the minor program will be a popular option for students in the life sciences, and will enhance their marketability for both academic and industry positions.