Senate Reference No. 14-23

MEMORANDUM

TO: Fort Wayne Senate
FROM: Laurie Corbin, Chair
Curriculum Review Subcommittee
DATE: 26 February 2015
SUBJ: Concentration in Genetics, Cellular, and Molecular Biology

The Curriculum Review Subcommittee voted on February 25 to approve the attached proposal for the Concentration in Genetics, Cellular, and Molecular Biology. The committee finds that the proposed degree requires no Senate review.

Approving:	Not Approving	Absent
Laurie Corbin		
Ron Duchovic		
Cheryl Duncan		
Gail Hickey		
Craig Hill		
Nancy Jackson		
Chenwei Li		
David Liu		
Susan Skekloff		

Proposal for a Concentration in Genetics, Cellular, and Molecular Biology
Indiana University-Purdue University Fort Wayne
December 1, 2014

Developed by:
George Mourad, Professor of Biology
Punya Nachappa, Assistant Professor of Biology
Tanya Soule, Assistant Professor of Biology
Mark Jordan, Associate Professor of Biology

I. Name of proposed concentration

Bachelor of Science in Biology with a concentration in Genetics, Cellular, and Molecular Biology

II. Title of degree to be conferred:

Bachelor of Science

III. Field of study, department, and school involved

Genetics, Cellular, and Molecular Biology, Department of Biology, COAS

IV. Objectives of the proposed concentration

The goal of this concentration is to prepare students to be at the forefront of genetics, cellular and molecular biology. Students will share a common curriculum of traditional biology disciplines along with in-depth training in the aforementioned areas. Students will not only learn basic concepts, but also current techniques employed in research labs. A wide range of electives will expose students to concepts and applications in molecular genetics, developmental biology, cellular biology, microbiology, virology, 'omics, immunology, and biotechnology. This multi-disciplinary education and training will prepare students for entry into graduate schools and many areas in the industry including, medicine and health care, pharmaceutical and drug discovery, agriculture, biotechnology, and environmental research.

V. Proposed date of initiation

Fall 2015

VI. Relationship of the proposed program to the mission and scope of the campus

Department Mission – "The Department of Biology is committed to offering high quality undergraduate and graduate educational opportunities" . . . . "The Bachelor's and Master's degrees provide students with the education and training needed to enhance their career opportunities, or to pursue further graduate studies."

This concentration supports the Department mission by providing students with an opportunity to enrich their academic program in a major discipline of biology in preparation for graduate study. Additionally, the concentration will provide students with the conceptual framework and laboratory skills needed to prepare for careers in biotechnology, medicine, agriculture, and education.

College Mission – As part of the College of Arts and Sciences "The college provides students with a breadth of knowledge about the global environment and fosters an appreciation and respect for diversity. The College of Arts and Sciences equips students to think critically, communicate effectively, and develop creative solutions to future challenges."

The proposed concentration supports the College mission by providing students with deep understanding of a fundamental area of biology that has broad impact on personal, societal and cultural issues. Students will gain knowledge and skills that are needed for maximizing the benefits of progress in biotechnology while minimizing risks in its application.

University Mission – "IPFW is a comprehensive university that provides local access to globally recognized baccalaureate and graduate programs that drive the intellectual, social, economic, and cultural advancement of our students and our region"

The proposed concentration supports the University mission by significantly enhancing the biology degree by offering students a specialized focus of study. The concentration will also prepare students with skills and abilities to seek graduate study or career opportunities that rely on the knowledge and application of genetics and molecular biology.

VII. Relationship of the proposed program to already existing programs within the campus

The proposed concentration would be a unique option for students already in the existing Biology major. No other programs on campus focus on the disciplines covered by the proposed concentration (genetics, cellular and molecular biology).

VIII. Cooperative endeavors explored and/or intended with other institutions

Several biotechnology and pharmaceutical companies in the region and beyond have hired IPFW biology graduates (BS and MS) who have done research in the genetics and molecular biology discipline. For example Tyler Mansfield was hired by Dow AgroSciences (Indianapolis), Richard Emerick was hired by Eli Lilly (Indianapolis), Brian Snook was hired by Schering Plough Pharmaceuticals (Indianapolis), Joshua Prabhakar was hired by Glaxo Smith Kline (North Carolina). Formalizing student training in the disciplines of genetics, cellular and molecular biology, by making available the newly proposed concentration within Biology, will only enhance our graduates' opportunities to be competitive, regionally and nationally, for employment in the biotechnology and pharmaceutical industry as well as for admission into Ph.D. programs and professional doctoral programs (e.g. medical, dental, veterinary medicine). The newly proposed concentration may serve as a feeder to biotech and pharmaceutical industries in the region. The newly proposed concentration may also provide collaborative opportunities, curriculum- and research-wise, with the nearby IU-Fort Wayne medical school (on campus) and College of Pharmacy, University of Manchester (north of Fort Wayne).

IX. Need for the concentration

Graduates with a concentration in genetics, cellular and molecular biology should be well positioned to pursue careers in biotechnology and laboratory science. According to the Indiana Department of Workforce Development (http://www.hoosierdata.in.gov), demand for the broad area of "Life, Physical, and Social Science" occupations is expected to increase by 14.3%

over the next ten years in Indiana. Among the specific occupations with relevance to the proposed concentration, growth is projected in Life Scientists (16.5%), Animal Scientists (5.9%), Soil and Plant Scientists (20.2%), Medical Scientists (27.8%), and Agricultural and Food Science Technicians (8.9%).

X. Resources required over and above current levels to implement the proposed concentration

The Department of Biology has the resources to support the proposed concentration.

Library questionnaire

The Genetics, Cellular and Molecular Concentration is nested within the Biology B.S. It draws from elective courses that are routinely taught in the department but packages them in specific way to form the concentration. Hence, we anticipate no change in the use of library resources as a result of the concentration since there is no addition of courses to the current curriculum. We provide this as context for answers to the specific questions below.

Which databases/indexing sources will be used by the courses in this program?

- PubMed
- Scopus
- Biological Sciences Collection (ProQuest)
- Google Scholar
- Web of Science

What are the journals that will be used by students completing library research in this program? Please list three to five titles. Is there an expectation that access to new journals will need to be purchased for students in this program?

- Public Library of Science (PLoS ONE) (PLoS Genetics)
- Journal of Medical Biochemistry
- Science
- BMC Genomics

- Additional journal subscriptions are not necessary.

Are there any specific reference sources (e.g. encyclopedias, handbooks, standards, etc.) required to support the new program?

No.

Is there an expectation for additional books to be purchased? What about DVD or audio/visual materials? What is the estimated dollar amount needed yearly to support this program with new books and media materials?

No additional materials will be necessary beyond the allocation provided to the Department of Biology.

Will the new program use the Library's Document Delivery Services? Costs for this service come out of the Library's budget. What types of materials would the program be requesting through DDS?

Document Delivery Service requests are not expected to increase as a result of the proposed concentration.

Who is the liaison librarian for this program? The liaison librarian provides support through involvement in Blackboard-supported classes, one-on-one research consultations, in-class instructional sessions, and tailored course guides for research assignments. Which of these librarian services do you anticipate will be utilized in the new program?

David Dunham is the liaison for Biology and would serve the concentrations within the major.

At this time none of the specific services described are anticipated. While there may be some student research consulting, the demand should not increase beyond the current usage.

Is there an accrediting body that will be overseeing this program? What are the statements of the accrediting body related to the library, e.g. holdings, personnel, services?

Accreditation of the Biology B.S. is part of the IPFW accreditation by the North Central Association of Colleges and Schools, Higher Learning Commission. In their "Criteria for Accreditation" (Number CRRT.B.10.010) it is stated in component 3.D.4 that: *The institution provides to students and instructors the infrastructure and resources necessary to support effective teaching and learning (technological infrastructure, scientific laboratories,* ***libraries****, performance spaces, clinical practice sites, museum collections, as appropriate to the institution's offerings).*

XI. Proposed curriculum (Total 120 credits for the degree)

The concentration requires a total of **19 credits** of upper division courses as follows: 10 required credits distributed among genetics (BIOL 50600), cell biology (BIOL 38100), and molecular biology with lab (BIOL 50900/BIOL58400); 6 credits elected from a list of biology courses (including 3 lab courses) that encompass all aspects of the concentration; and a required 3-credit biochemistry (CHM 53300) course that provides the biochemical foundation of the concentration. The 3-hour molecular biology lab (BIOL 58400) provides a broad spectrum of molecular experiments justifying its requirement for the concentration. In addition, **101 credits** are fulfilled by the core curriculum in biology, supporting areas in chemistry, physics, mathematics, foreign language, general education and free electives. Therefore, the concentration requires a total of **120 credits** (depending on the biology elective being with or without lab). Note that this concentration groups existing courses offered as upper division biology electives and does not modify the set of core courses required of all biology majors.

Area	Course #	Course name	Credits
Required			
Genetics	BIOL 50600	Human Molecular Genetics	3
Cellular	BIOL 38100	Cell Biology	3
Molecular Biology	BIOL 50900	Molecular Biology and Applications	3
	BIOL 58400*	Molecular Biology and Applications Lab	1
			10
Biology Electives			
Genetics	BIOL 52400	Bacterial Diversity and Systematics	3
	FNR 50500	Molecular Ecology and Evolution	3
Cellular	BIOL 43700*	General Microbiology	4
	BIOL 53700	Immunology	3
	BIOL 56500*	Immunology Lab	1
	BIOL 56600	Developmental Biology	3
	BIOL 56700*	Laboratory in Developmental Biology	1
Molecular Biology	BIOL 51600	Molecular Biology of Cancer	3
	BIOL 53300	Medical Microbiology	3
	BIOL 54000	Biotechnology	3
	BIOL 54400	Principles of Virology	3
	BIOL 51810	Biomedicine	3
		6 credits from above	**6**
Biochemistry	CHM 53300	Introduction to Biochemistry	**3**
		Total credits required	**19**

*Courses with lab

XII. Four-Year Plan

Freshman Year			**31**
First Semester	**Gen Ed**	**Course**	**14**
COM 11400	A2	Fundamentals of Speech	3
MA 22900 (P:MA15300)	A3	Calculus I	3
BIOL 11700		Principles of Ecology and Evolution	4
CHM 11500	B4	General Chemistry I	4
Second Semester		**Course**	**17**
GenEd B5	B5		3
ENG W131	A1	Elementary Composition I	3
BIOL 11900		Principles of Structure and Function	4
CHM 11600		General Chemistry II	4
Free Elective			3

Sophomore Year			**30**
Third Semester		**Course**	**15**
BIOL 21900		Structure & Function	4
CHM 25500/25400		Organic Chemistry w/ lab	4
Foreign Language I	B7	Foreign Language I	4
GenEd B6	B6		3
Fourth Semester		**Course**	**15**
Foreign Language II	A/B elect.	Foreign Language II	4
BIOL 21800		Genetic and Molecular Biology	4
CHM 25600/25800		Organic Chemistry w/ lab	4
STAT 24000		Statistical Methods for Biology	3

Junior Year			**30**
Fifth Semester		**Course**	**16**
PHYS 22000	A/B elect.	General Physics I	4
BIOL 21700		Intermediate Ecology	3
STAT 34000		Elementary Statistical Methods II	3
BIOL 38100		Cell Biology	3
Free Elective			3
Sixth Semester		**Course**	**14**
PHYS 22100		General Physics II	4
BIOL 50900/58400		Molecular Biology and Applications with lab	4
ENG W233	A/B elect.		3
Free elective			3

Senior Year			**29***
Seventh Semester		**Course**	**15-16**
BIOL 50600		Human Molecular Genetics	3
GCM elective - BIOL 51810/52400/54400/43700/51600		Biomedicine/Bacterial Diversity and Systematics/Principles of Virology/ General Microbiology/ Molecular Biology of Cancer	3-4
CHM 533		Biochemistry I	3
Free electives			7
Eighth Semester		**Course**	**12-13**
BIOL 49100	C8	Senior Biology Seminar	3
GCM elective - BIOL 54000/56600/56700/ FNR 50500/BIOL 53300/53700/56500		Biotechnology/Developmental Biology/ Molecular Ecology and Evolution/ Medical Microbiology/Immunology	3-4
Free electives			6
		Total	**120**

Highlight indicates courses towards fulfilling the 19-hour GCM concentration
*Choices are possible among elective courses but the total number of credit hours must reach 120.