



Proposal to the Senate Educational Policy Committee

PROPOSAL TITLE:

Establish a Master of Science in Molecular & Cellular Biology (M.S. in MCB) in the School of Molecular & Cellular Biology.

SPONSOR:

Kelly Ritter, Associate Dean, College of LAS; Tel. 217.333.1350; ritterk@illinois.edu.

BRIEF DESCRIPTION:

We propose to develop and deliver a non-thesis-based MS degree program in Molecular & Cellular Biology (M.S. in MCB). This Master degree program would be directed toward students who want advanced preparation for professional school or future careers in industry, government or academia. The purpose of this degree program is to provide an educational option for advanced study in the field of molecular and cellular biology without requiring a research thesis component.

JUSTIFICATION:

This proposal is in part a result of a desire to extend our graduate offerings to currently underserved populations. The School of MCB does not have an MS program. The Departments in MCB have MS programs that are used primarily for terminal degrees awarded to Ph.D. students who have passed their qualifying examinations, but have chosen to leave the program. No students are admitted to these terminal degree programs.

The development of the MS in MCB program would primarily serve two groups of individuals that we are currently not serving. They are:

1. One target group would be students who take a gap year after earning a BS, but prior to admission to professional or graduate school. This group often takes a year to complete volunteer and community outreach requirements for medical school and other professional schools. In our most recent exit survey of our graduating class, 38% (118 of 313 respondents) indicated that they are taking a gap year during which they will apply to graduate or professional schools. The survey also indicated that another 10% (32 of 313 respondents) have applied to graduate or professional schools and are waiting for admission. We believe that an MS degree might be quite

attractive to both of these groups as a mechanism for deepening their knowledge base, improving GPAs if needed, helping to distinguish themselves from among the applicant pool, and better preparing them for the next program. This group of students would include our own (B.S. from Illinois at Urbana-Champaign), as well as those who have earned B.S. degrees from other institutions. We currently have a group of non-degree graduate-level students who take our courses each year in preparation for professional or graduate school application. We would also target this population. Because gap years are usually just one year, we have carefully chosen a set of courses that could be completed in two semesters if a student wishes, as opposed to the more usual 3-4 semesters for an MS degree.

2. Our second target group would be students who plan to obtain employment in industry, government, or nongovernmental organizations. Our most recent senior survey identified 10% of our graduates (31/313) as already being employed and another 20% (64/313) as having applied but not yet been hired. Jobs for our graduates span many areas that include pharmaceutical and biotechnology industry, chemical and food industry, policy and other government positions, regulatory and consulting agencies, and nongovernmental organizations. Students with a BS degree are hired by these entities each year, but an MS degree would certainly make such opportunities more favorable for them to secure a position. Students earning the MCB or BIOC BS degrees have always had the reputation of having greater laboratory technique skills than many of their peers from other institutions. This comes mainly from the fact that our degree programs require a minimum of three intense laboratory courses, two at the 200-level and at least one at the 300- or 400-level. In many cases these skills turn out to be the deciding factor in hiring. For students wishing to bolster their laboratory skills without necessarily conducting a research project, we have included three current advanced laboratory courses as options that can be selected, and we are planning an additional laboratory course in physiology that will become available to students in the next few years.

BUDGETARY AND STAFF IMPLICATIONS:

1) Resources

- a. How does the unit intend to financially support this proposal?

Currently, we have the capacity to enroll additional students in our upper-level courses and are prepared to set aside seats as needed to ensure that students have access to courses that match their educational interests and aims.

- b. How will the unit create capacity or surplus to appropriately resource this program? If applicable, what functions or programs will the unit no longer support to create capacity?

Because the MS degree program enrollment would be distributed across fifty existing courses (see MS in MCB List of Approved Courses), we do not expect it to adversely affect our current mechanism of enrollment management. Our current plan includes the admission of 10-15 students in cohort one and each following cohort, which would mean a maximum of 30 total students to serve if all the students were to choose the 2-year model of completion.

- c. Will the unit need to seek campus or other external resources? If so, please provide a summary of the sources and an indication of the approved support.

There should be no need to seek additional resources. We already have staff who can support the needs of the small number of students in this program.

- d. Please provide a letter of acknowledgment from the college that outlines the financial arrangements for the proposed program.

2) Resource Implications

- a. Please address the impact on faculty resources including the changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc.

The single change that this program would bring is a slight increase in enrollment in some of our advanced courses (e.g. one or two students more in any given course), and the correlating slight increase in our faculty/student ratios. With a starting maximum of 30 possible students in this program at any given time, we would increase the per-faculty number of students by roughly ½ student per faculty member or one student for every two faculty members. Because we propose to admit no more than 15 students each year (a total of 30 at full capacity with students on the 2-year plan), these students would be distributed out over approximately 50 courses for either two or four semesters. We expect that no extra seats will need to be added to any one course. For each of the laboratory courses on the list, we would make 1-2 seats available to students in this program. This would not change the cost of the course in terms of TAs, equipment or materials. In essence, these seats are already being paid for in the current cost of the course. The number of faculty and teaching load would not be affected in any way by this program. We do plan to provide academic advising for the students in this program from among our faculty. We anticipate one or two MCB faculty members to provide regular advising/planning meetings with each admitted student in order to 1. assure that students are selecting courses wisely and within a coherent path and 2. be sure that students have a faculty advisor to whom they can go for academic and career guidance.

- b. Please address the impact on course enrollment in other units and provide an explanation of discussions with representatives of those units. (*A letter of acknowledgement from units impacted should be included.*)

There are no courses from other units contained in this proposal so there is no impact of this kind.

- c. Please address the impact on the University Library (*A letter of estimated impact from the University Librarian must be included for all new program proposals. If the impact is above and beyond normal library business practices, describe provisions for how this will be resourced.*)

There will be no impact on the University Library. See attached letter.

- d. Please address the impact on technology and space (e.g. computer use, laboratory use, equipment, etc.).

There will be no impact on technology or space. The courses in this program are already being delivered in spaces with or without technology and their max capacities will not change.

For new degree programs only:

- 3) Briefly describe how this program will support the University's mission, focus, and/or current priorities. Include specific objectives and measurable outcomes that demonstrate the program's consistency with and centrality to that mission.

This program addresses four elements of the University's Vision: 1) It creates a new degree program where one has not existed since before the creation of the School of Molecular and Cellular Biology. Specifically, it will provide students with the opportunity to earn an MS degree (distinct from seeking a PhD), where no such opportunity existed in the recent past. This degree can serve them in many ways either through admission for further advanced studies in graduate or professional programs or through increased earning power and influence in industry or government jobs or other arenas. 2) This degree program will support economic development by funneling more highly qualified Illinois residents into jobs in the State of Illinois and elsewhere. 3) This program meets the request of our College to find new ways to generate revenue. This program, as proposed, would do this with minimal new investment, and will provide a revenue stream for the future that could be reinvested to support all of our Instructional Programs. 4) This program will also meet certain needs of many underrepresented minority students in STEM areas, such as MCB. Because such students sometimes require considerable preparatory coursework during their BS programs, but then go on to excel in the major itself, they may not have had the time and opportunity during their BS work to explore various specialized curricular topics that are offered only in advanced 400-level courses. These students, whom we see as an important part of our MCB community, would benefit from an MS program that allows them to explore these additional areas of specialization in a terminal degree program, before choosing a particular career path.

Areas of specialization would naturally follow from our four departmental disciplines, as can be seen in our Approved List of Courses. Students interested in graduate school would elect courses in the discipline they plan to pursue along with courses in complementary disciplinary areas. The purpose would be to deepen their knowledge base and problem-solving skill set in preparation for graduate study and research. Skills development would come from every course experience, but particularly so from advanced laboratory courses specializing in the practical and experimental nature of MCB. Students will also gain advanced training in reading and analyzing the primary research and clinical literature and will gain practice in communicating scientific concepts and data to not only other professionals, but also the general public. The knowledge and skill sets gained through this program can be applied to many future career goals, including medical, graduate or professional schools, the biotechnology and pharmaceutical industry, university research or hospital biomedical diagnostics laboratories, teaching at multiple levels, science journalism, intellectual property and patent law, government policy, regulatory agencies, nongovernmental organizations, science marketing and scientific equipment sales, and many other options.

Students interested in medical school, or other allied-health professional schools, would have multiple options. One path might be to diversify their background so as to be more evenly prepared for study across the spectrum of disciplines that support the study of medicine. The other path might be to build on an already diversified bachelor degree experience by focusing on advanced coursework, and literature, from one area of interest within MCB. In both cases, students can choose from a wide range of course topics, including advanced biochemistry, molecular genetics, cell biology, microbiology, neurobiology, systems and computational biology, and laboratory methods.

Students would have the opportunity to take advanced 400-level laboratory courses, gaining the experimental bench skillsets valued by industry, biotechnology companies, university research and hospital diagnostics laboratories. They will also take advanced lecture, discussion, and seminar courses that hone scientific critical reading, analytical thinking and communication skills that are highly desirable for future employers.

- 4) Please provide an analysis of the market demand for this degree program. What market indicators are driving this proposal? What type of employment outlook should these graduates expect? What resources will be provided to assist students with job placement?

This program responds to the national priority for training graduate students at the master's level for careers outside of academia, providing foundational background for successful performance in industry, governmental or corporate environments, where scientific knowledge, critical thinking, and problem-solving experiences are vital. While we have not conducted a full market analysis, we do require our BS graduates to submit a senior exit survey and have a very high rate of response on the instrument (74%). These responses, as cited in prior questions, suggest that there is a significant market for this degree program among our just graduating BS students, which is expected to be on par with a similar group of students from other institutions. Quite simply, students can go farther in their careers with an MS degree in MCB, and it can serve them in a multitude of ways either via improved employment opportunities or improved admission offers from graduate and professional schools. The employment outlook for the group moving into industry is robust. Our students commonly are hired by large companies, such as AbbVie, Abbot Laboratories, Eli Lilly, Pfizer, Monsanto, and Kimberly-Clark. Indeed, these companies frequently visit the campus, seeking new recruits from our MCB programs. We predict increased interest by the companies in students with an MS in MCB degree. For students seeking admission to graduate or professional school, the MS degree will help them to distinguish themselves from among a large group of highly qualified applicants. We would hope to make maximum use of the Graduate Career Development Office and their services as a resource for our students working toward employment at the end of their degree program.

- 5) If this is a proposed graduate program, please discuss the programs intended use of waivers. If the program is dependent on waivers, how will the unit compensate for lost tuition revenue?

This plan does not propose to use any graduate waivers. Most, if not all, of the students would pay tuition as full-time students and would not receive tuition or fee waivers. Since

none of the students in this program will be working in faculty research laboratories, these students would not accept Research Assistantships. We do not anticipate that these students would serve as Teaching Assistants, and so the School of MCB does not anticipate entering into funding agreements with these students on a regular basis. Because one of our objectives for this program is revenue generation, and because we imagine that many students in this program will opt for the 1-year schedule, we believe that students will be unable to manage the course load and a teaching appointment. From time to time however, MCB hires graduate students from non-MCB degree programs to fill TA positions. It may be possible that we would choose to hire a graduate student from this MS in MCB degree program rather than a non-MCB program, as these students would be the preferred pool from which to choose. We would do this with consideration for how it would serve the MS students financially and by providing instructional experience as well as how it would affect the revenue return.

DESIRED EFFECTIVE DATE:

We are eager to admit students to this program for the earliest fall term that is available, once we have received all required levels of approval. We would very much like to do this for Fall 2018 enrollment with the admission process beginning in Fall 2017 and Spring 2018. However, we realize that this might be too optimistic and would accept Fall 2019 as a start date, with the admission process happening in Fall 2018 and Spring 2019.

CLEARANCES:

Signatures:

Brenda Anne Wilson

11-16-16

Unit Representative: Professor Brenda Anne Wilson

Date:

Kelly Riff

9-12-17

College Representative:

Date:

Graduate College Representative:

Date:

STATEMENT FOR ACADEMIC CATALOG:

OVERVIEW Tab

The Master of Science in Molecular and Cellular Biology (MS in MCB) at the University of Illinois provides a non-thesis, course-based degree program for those students interested in additional advanced preparation for professional or graduate school or for future careers in industry, government or academia. The goal of the program is to provide students with a strong and broad educational background and problem-solving skill set in molecular and cellular biology at the advanced level without requiring a research thesis component. While the MS in MCB program is suitable as preparation for a PhD program in MCB or related areas, it is uncommon for students to enter the MCB PhD program at the University of Illinois after finishing this degree.

The MS in MCB degree program serves primary two different audiences:

- Those students who wish to obtain a master's degree during a post-baccalaureate gap year, but prior to admission to professional or graduate school, by deepening and broadening their scientific knowledge base to better prepare for the next degree program.
- Those students who plan to obtain employment in industry, government, or nongovernmental organizations, where additional coursework at the advanced level would enhance their competitiveness, and in particular, where their laboratory skills could be bolstered through advanced laboratory courses without the necessity of conducting a research-based thesis project.

Students will take foundation and advanced courses from an approved list in the School of Molecular and Cellular Biology, choosing from a wide range of course topics, including biochemistry, molecular genetics, cell biology, microbiology, neurobiology, systems and computational biology, and advanced laboratory methods. Students will take advanced lecture, discussion, and seminar courses that hone scientific critical reading, analytical thinking, and communication skills that are highly desirable for advanced degree programs and future employers.

The MS in MCB degree requires a minimum of two full-time semester, which can be completed within one year, depending on prior education and experience. Some students may choose to take up to two years to complete, if they hold outside employment, but it is intended to be completed within two years. To maintain active status in the program, students must register for a minimum of 12 credit hours in 400- or 500-level MCB courses per semester.

Students entering the MS in MCB program will be expected to have completed a Bachelor's degree from an accredited 4-year college or university with undergraduate coursework in biology, chemistry, physics, calculus and English composition. Applicants must have completed the last 60 hours of coursework with grades of B (3.0 on a scale of 1 to 4) or better. Deficiencies

in these areas will require additional coursework, as necessary, for successful completion of the degree.

MASTERS Tab

Master of Science Molecular and Cellular Biology

To maintain active status in the program students must register for a minimum of 12 credit hours in 400- or 500-level MCB courses per semester.

A course-based master's degree requires a minimum of two full-time semesters.

Core Curriculum Hours Required	12-14
One 3- or 4-hour 400-level course from each of 4 disciplinary areas ¹	
Area 1 Biochemistry	
Area 2 Cell & Developmental Biology	
Area 3 Microbiology	
Area 4 Molecular & Integrative Physiology	
Electives Hours Required	6-8
Courses to be chosen from the MS in MCB approved list of courses ¹	
Minimum 500-level Hours Required	12
Courses to be chosen from the MS in MCB approved list of courses ¹	
Total Hours Required	32

Other Requirements¹

Minimum Hours Required Within the Unit:	8
Minimum GPA:	3.0
Courses taken "credit/no credit" may not be used toward degree requirements.	
Courses, or their equivalents, taken as an undergraduate/prior to admission to this program, may not be counted toward the requirements for this program.	
MCB 450 is only available to students who have not already taken MCB 354 or the equivalent.	

¹ For additional details and requirements refer to the MS MCB Program Handbook and the Graduate College Handbook.	
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Appendix A
Master of Science Degree in MCB (Course-based MS Program)
MS MCB List of Approved Courses*

Required courses (12-14 hr.)

One 3- or 4-credit hour course from each area is required. Remaining elective hours (6-8 hours) may also be filled from this list.

Area 1: Biochemistry

- MCB 406: Gene Expression and Regulation (3 hr.)
- MCB 446: Physical Biochemistry (3 hr.)
- MCB 450: Introductory Biochemistry (3 hr.)
- BIOC 440 sxn B: Physical Chemistry Principles (4 hr.)
- BIOC 445: Current Topics in Biochemistry (3 hr.)
- BIOC 455: Techniques in Biochemistry and Biotechnology (4 hr.)*

Area 2: Cell & Developmental Biology

- MCB 400: Cancer Cell Biology (3 hr.)
- MCB 410: Developmental Biology (4 hr.)
- MCB 458: Basic Human Pathology (3 hr.)
- MCB 471: Advanced Cell Biology (3 hr.)
- MCB 493 sxn ECB: Special Topics in MCB (Eukaryotic Cell Biology Lab) (2 hr.)*

Area 3: Microbiology

- MCB 421: Microbial Genetics (3 hr.)
- MCB 424: Microbiology Biochemistry (3 hr.)
- MCB 426: Bacterial Pathogenesis (3 hr.)
- MCB 428: Microbial Pathogens Laboratory (2 hr.)*
- MCB 429: Cellular Microbiology and Disease (3 hr.)
- MCB 431: Microbial Physiology (3 hr.)
- MCB 432: Computing in Molecular Biology (3 hr.)
- MCB 435: Evolution of Infectious Disease (3 hr.)
- MCB 436: Global Biosecurity (1 hr.)
- MCB 493 sxn EGD: Special Topics in MCB (Exploring Genomic Data) (1 hr.)
- MCB 493 sxn VIR: Special Topics in MCB (Viral Pathogenesis & Evolution) (3 hr.)

Area 4: Molecular & Integrative Physiology

- MCB 401: Cell and Membrane Physiology (3 hr.)
- MCB 402: Systems & Integrative Physiology (3 hr.)
- MCB 413: Endocrinology (3 hr.)
- MCB 419: Brain, Behavior, and Info Process (3 hr.)
- MCB 461: Cell and Molecular Neuroscience (3 hr.)
- MCB 462: Integrative Neuroscience (3 hr.)
- MCB 465: Human Metabolic Disease (3 hr.)
- MCB 493 sxn FIP: Special Topics in MCB (Frontiers in Physiology) (2 hr.)

MCB 493 sxn HMG: Special Topics in MCB (Human Medical Genomics) (3 hr.)
MCB 493 sxn UNK: Special Topics in MCB (unnamed Physiology Lab) (2 hr.)*

Electives at the 500-level:

A minimum of 12 hours at the 500-level is required.

MCB 501: Advanced Biochemistry (4 hr.)
MCB 502: Advanced Molecular Genetics (4 hr.)
MCB 513: Survey of Neurobiology (1 hr.)
MCB 521: Advanced Microbial Genetics (1 hr.)
MCB 529 sxn LJS: Special Topics in CDB (Genomic Biology Workshop) (2 hr.)
MCB 529 sxn THD: Special Topics in CDB (Topics in Health & Disease) (2 hr.)
MCB 529 sxn VM: Special Topics in CDB (Viruses of Microbes) (1 hr.)
MCB 526: Advanced Bacterial Pathogenesis (1 hr.)
MCB 532: Advance Microbial Physiology (1 hr.)
MCB 534: Advanced Microbial Metabolism (1 hr.)
MCB 539: Advanced Cellular Microbiology (1 hr.)
MCB 553: Enzyme Reaction Mechanisms (3 or 4 hr.)
MCB 555: Analysis of Biochemical Literature (2 hr.)

*Other courses may be available. See MS MCB Program Office for review of request.

UNIVERSITY OF ILLINOIS
AT URBANA - CHAMPAIGN

University Library
Office of Dean of Libraries
and University Librarian
230 Main Library, MC-522
1408 West Gregory Drive
Urbana, IL 61801



November 21, 2016

Brenda A. Wilson
Professor of Microbiology and Associate Director for Undergraduate Education
School of Molecular and Cellular Biology
393 Morrill Hall
M/C 119

Dear Prof. Wilson:

Last week, we received a proposal to establish a new Master of Science in Molecular & Cellular Biology (M.S. in MCB) in the School of Molecular & Cellular Biology.

Based upon the documents received and reviewed by Kelli Trei during the week of November 13, 2016, it is our belief that there will be no significant impact on collection development, instruction, or other operations in the University Library. If additional services or materials are required as the program develops, we will be happy to discuss those needs as they emerge.

Sincerely,

A handwritten signature in black ink, appearing to read 'John P. Wilkin', with a large flourish extending to the left.

John P. Wilkin
Juanita J. and Robert E. Simpson
Dean of Libraries and University Librarian

e-c: Thomas Teper
Kelli Trei

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

EP.18.19

Revised Per EdPol
questions 11-3-17

Office of the Provost and Vice Chancellor for Academic
Affairs

Swanlund Administration Building
601 East John Street
Champaign, IL 61820



October 5, 2017

Gay Miller, Chair
Senate Committee on Educational Policy
Office of the Senate
228 English Building, MC-461

Dear Professor Miller:

Enclosed is a copy of a proposal from the College of Liberal Arts and Sciences to establish the
Master of Science in Molecular and Cellular Biology.

Sincerely,

A handwritten signature in cursive script, appearing to read 'Kathryn A. Martensen'.

Kathryn A. Martensen
Assistant Provost

Enclosures

c: K. Ritter
A. Elli
B. Wilson
A. McKinney
J. Hart
A. Edwards
E. Stuby

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN



Graduate College

110 Coble Hall
801 South Wright Street
Champaign, IL 61820-6210

Executive Committee

2017-2018 Members

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Dean & Chair
Graduate College

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Art & Design

Zachary Berent
Graduate Student, Mechanical
Science & Engineering

Xialoing Chen
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Kent Choquette
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Eleanor Courtemanche
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Spanish & Portuguese

George Gasyna
Slavic Languages & Literature

Julie Hengst
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Tania Ionin
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Karla Moller
Curriculum & Instruction

Lori Raetzman
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Physiology

Katie Ranard
Graduate Student, Nutritional
Sciences

Sandra Rodriguez-Zas
Animal Sciences

Sela Sar
Advertising

Mark Steinberg
History

Terri Weissman
Art & Design

October 5, 2017

Kathy Martensen
Office of the Provost

Dear Kathy,

Included is a proposal from the College of Liberal Arts and Sciences to “**Establish a Master of Science in Molecular and Cellular Biology**”.

The proposal was received on September 20, 2017 and reviewed at the Graduate College Executive Committee meeting on September 22, 2017. The committee approved the proposal with one suggestion related to the name of the degree. We have had conversation with the proposal sponsor who has decided to decline the suggestion. We find that this proposal meets the standards of Graduate Education at Illinois. We now forward for your review.

Sincerely,

A handwritten signature in black ink, appearing to read 'John C. Hart', with a long horizontal flourish extending to the right.

John C. Hart
Executive Associate Dean
Graduate College

c: Kelly Ritter

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

University Library
Office of Dean of Libraries
and University Librarian
230 Main Library, MC-522
1408 West Gregory Drive
Urbana, IL 61801



November 21, 2016

Brenda A. Wilson
Professor of Microbiology and Associate Director for Undergraduate Education
School of Molecular and Cellular Biology
393 Morrill Hall
M/C 119

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John P. Wilkin
Juanita J. and Robert E. Simpson
Dean of Libraries and University Librarian

e-c: Thomas Teper
Kelli Trei