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ACADEMIC SENATE, MERCED DIVISION
GRADUATE COUNCIL
LEROY WESTERLING, CHAIR
lwesterling@ucmerced.edu

UNIVERSITY OF CALIFORNIA, MERCED
5200 NORTH LAKE ROAD
MERCED, CA 95343
(209) 228-6312

FEBRUARY 19, 2019

TO: MIRIAM BARLOW, GRADUATE CHAIR, QUANTITATIVE AND SYSTEMS BIOLOGY

FROM: LEROY WESTERLING, CHAIR, GRADUATE COUNCIL

RE: PROPOSED CONCENTRATION IN ECOLOGY AND EVOLUTIONARY BIOLOGY IN THE QSB GRADUATE PROGRAM

At its January 31, 2019 meeting, Graduate Council (GC) approved the proposed concentration in Ecology and Evolutionary Biology in the Quantitative and Systems Biology graduate degree program effective Fall 2019.

Graduate Council recognizes that the proposed Ecology and Evolutionary Biology concentration, interdisciplinary by design, will have a distinct intellectual footprint on campus. This was highlighted during discussion at Graduate Council's meeting where members were assured that graduate students could take courses in both the Molecular Cell Biology (MCB) and EEB concentrations.

The proposal was reviewed, per Senate policy, by the Committee on Academic Planning and Resource Allocation (CAPRA) and the Vice Provost and Graduate Dean of Education, Marjorie Zatz, as well as the Office of Periodic Review, Assessment and Accreditation Support (OPRAAS) and the Office of the Registrar. Their comments are enclosed. All entities wrote positively about the proposed concentration's contributions to graduate education at UC Merced. Additionally, as OPRAAS's notes, the proposed changes to the QSB degree do not result in a significantly different program for accreditation purposes, as such the concentration may be implemented without additional accreditation review.

Finally, please note that the EEB concentration will be listed on a student's transcript, rather than diploma (as outlined in the proposal) in keeping with Graduate Council's policy governing the establishment of concentrations and designated emphases.

CC: Graduate Council
Senate Office
Senate Chair
Betsy Dumont, Dean, School of Natural Sciences
Office of Periodic Review, Assessment and Accreditation Support (OPRAAS)
Vice Provost and Dean of Graduate Education Marjorie Zatz
Office of the Registrar
Committee on Academic Planning and Recourse Allocation (CAPRA)

Encl (4)

QSB Proposal for a New Concentration in Ecology and Evolutionary Biology

Sections

1. Proposal for a New Concentration in Ecology and Evolutionary Biology within the Quantitative and Systems Biology Program at UC Merced

Introduction

In response to the Graduate Council's policy on Concentrations and Designated Emphases Policy dated (XXX), the Quantitative and Systems Biology (QSB) graduate program proposes to establish a new Concentration of the QSB doctoral degree, to be named as follows:

- Concentration in Ecology and Evolutionary Biology

This Concentration will be the second concentration established for the QSB doctoral degree, alongside the "Concentration in Molecular and Cellular Biology", which came online 2017.

Concentrations are elective and appear on the diploma of students who elect them. This proposal details the proposed curricular requirements of this new concentration in QSB.

The requirements for the core doctoral degree in QSB are reproduced here from our current draft revision to QSB Policies and Procedures for completeness and ease of reference.

Requirements for the Degree in Quantitative and Systems Biology (QSB)

Program Learning Outcomes (PLOs) of the Degree in QSB

1. **Quantitative and Systems Biology Skill (QB/SB)** Knowledge and understanding of quantitative (statistical, computational, and model-dependent) and high-dimensional experimental or observational approaches to biological systems, and demonstrated ability to conceive, plan, execute and/or interpret the applications of these approaches to research questions.
2. **Ethics** Knowledge and understanding of ethical standards in proposing and executing professional scientific research.
3. **Teaching/Communication** Ability to effectively assist in the teaching of science in a classroom environment, and engage in effective communication of original and existing scientific inquiry and results orally and in writing.
4. **Scholarship** Ability to undertake and demonstrate original graduate level scholarship in specialized areas of biology, including integrative command of historical and current literature and broader scientific context, and identification of open research problems.
5. **Research Ability** Ability to propose and defend a feasible research plan to apply scientific techniques to open research problems and execute, complete and defend original research that advances scientific knowledge.

Core Requirements

a. One graduate-level Quantitative Biology (QB) course (3-5 units)
b. One graduate-level Systems Biology (SB) course (3-5 units)
c. One graduate level QSB course of 3-5 units, excluding QSB 291 and QSB 295. QSB 201, QSB 249, QSB 270 and QSB 296 may be used to fulfill this requirement by petition if no other available course meets student's need.

Additional Requirements

d. QSB 291 - Seminar Series (2 units)
e. QSB 294 - Responsible Conduct of Research (1 unit)
f. No course may be used to fulfill more than one degree requirement

Criterion for Courses that fulfill the QSB Systems Requirement

Courses that fulfill the QSB Systems Requirement should provide exposure to the theoretical underpinnings from theoretical biology and complex systems science through primary and secondary literature of modern multiscale, high-resolution, high-dimensional science of biological systems, as well as empirical innovations that enable high-dimensional experimental and observational approaches to biological systems across multiple scales of biological organization.

List of Courses that fulfill the QSB Systems Requirement

This list is maintained and updated by QSB Educational Policy Committee

- QSB 200 Molecular Cell Biology
- QSB 215 Principles of Biological Technologies
- QSB 290 Current Topics in Quantitative and Systems Biology
- QSB 297 Systems Biology: From Molecules to Metabolic Networks

Criterion for Courses that fulfill the QSB Quantitative Requirement

Courses that fulfill the QSB quantitative requirement must provide introductory, graduate-level instruction in the theory and practice of one or more of the following: 1) scientific computing, 2) statistics, data science, and machine learning and 3) modeling and simulation.

List of Courses that fulfill the QSB Quantitative Requirement

- QSB 207 Physical Biochemistry
- QSB 214 Tissue Engineering
- QSB 246 Community Ecology
- QSB 251 Advanced Molecular Immunology
- QSB 269 Modeling Social Behavior
- QSB 271 Advanced Neurobiology
- QSB 280 Advanced Mathematical Biology
- QSB 281 Molecular Dynamics and Biomolecular Simulation
- QSB 282 Bioinformatics
- QSB 285 Biostatistics

Requirements for the Concentration in Ecology and Evolutionary Biology (EEB)

Program Learning Outcome (PLO) of the Concentration in EEB

Graduate level knowledge of current advances and theoretical foundations in both ecology and evolutionary biology, as well as extensive scholarship, teaching and research ability in one or more specialized areas of ecology and/or evolutionary biology, broadly defined.

Core Requirements for Degree with Concentration in EEB

a. One graduate-level course in Quantitative Biology (3 – 5 units)
b. One graduate-level course in Systems Biology (3 – 5 units)
c. One graduate-level course in Ecology* (3 – 5 units)
d. One graduate-level course in Evolutionary Biology* (3 – 5 units)

* Alternative courses that are not listed as fulfilling a specific requirement can be petitioned to qualify for one of the required subject areas.

Additional Requirements for Degree with Concentration in EEB

e. No course may fulfill more than one degree requirement
f. The dissertation must fall within the areas of ecology and/or evolutionary biology broadly defined, as determined by the student's dissertation committee.

Criterion for Courses that fulfill the Ecology Requirement

Substantial exposure to both the primary and secondary scientific literature in ecology and graduate level knowledge of the foundations of ecology.

Criterion for Courses that fulfill the Evolutionary Biology Requirement

Substantial exposure to primary and secondary scientific literature in evolutionary biology and graduate level knowledge of the foundations of evolutionary biology.

List of Courses that fulfill the Ecology Requirement.

This list is maintained and updated by QSB Educational Policy Committee in consultation with the QSB faculty.

- QSB 218 - Global Change Biology (3 units)
- QSB 245 - Biogeography (3 units)
- QSB 246 - Community Ecology (3 units)
- QSB 248 - Advanced Topics in Ecology (3 units)
- QSB 256 - Ecological Dynamics (4 units)

List of Courses that fulfill the Evolutionary Biology Requirement.

This list is maintained and updated by QSB Educational Policy Committee in consultation with the QSB faculty.

- QSB 244 - Phylogenetics (4 units)
- QSB 245 - Biogeography (3 units)
- QSB 257 - Evolutionary Dynamics (3 units)
- QSB 230 - Ecological Genetics (3 units)
- QSB 247 - Phylogenetic Comparative Methods (3 units)

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School of Natural Sciences
UNIVERSITY OF CALIFORNIA, MERCED
5200 NORTH LAKE ROAD
MERCED, CALIFORNIA 95344

To: Graduate Council, University of California, Merced
From: Miriam Barlow, Associate Professor & Quantitative Systems Biology Chair
Date: February 11, 2018
Subject: Ecology and Evolutionary Biology Concentration for Quantitative Systems Biology

In response to Graduate Council's policy on Concentrations and Designated Emphases Policy dated March 2, 2016, the Quantitative and Systems Biology (QSB) graduate program proposes to establish a new Concentration of the QSB doctoral degree, to be named as follows:

- Concentration in Ecology and Evolutionary Biology

Concentrations are elective and appear on the diploma of students who elect them. The included proposal details the proposed curricular requirements of this new concentration in QSB.

Concentration Description:
The goal of the Ecology and Evolutionary Biology Concentration is to equip students with knowledge and practice of the experimental and computation biology skills to study genetics, organisms, populations, and ecosystems. It also helps students build a solid scientific foundation and philosophical outlook that prepares them to tackle the challenges of cutting edge biological research. The Ecology and Evolutionary Biology

concentration provides training in community ecology, biogeography, phylogenetics, molecular evolution and/or evolutionary and ecological dynamics
.

Rationale:
1) Provide training in experimental ecology and evolutionary biology.
2) Attract new graduate students interested in ecology and evolutionary biology.
3) Provide documentation of training in experimental, theoretical and computational biology methods that will appeal to potential future employers of QSB program graduates, for example the biotechnology industry.

Need:
The Ecology and Evolutionary Biology concentration will help faculty in QSB attract and train students interested in these topics. It will also help in the development of metrics for assessing student cohort outcomes and needs.

Potential Resource Implications:
There will be a slight increase in effort for tracking student data, but the overall increased efficiency resulting from this stratification will likely mitigate this effort. We also anticipate increased applications to the QSB graduate program, potentially requiring expanded on-campus interviews (for example during Graduate Visitation Weekend). The Ecology and Evolutionary Biology concentration may help increase the number and quality of enrolled QSB students. No additional resource requirements are anticipated.

4. Status and Forecast of Ecology and Evolutionary Biology Graduate Course Offerings

Contributions to ecology and evolutionary biology themed courses are growing as additional ecological and evolutionary biologists join QSB. Historically, ecology courses (average 1 per semester from Fall 2015 to Fall 2017) have outnumbered evolutionary biology courses (average 0.8 per semester from Fall 2015 to Fall 2017). Within this same period, 2 new course offerings were introduced in Ecology, and 1 in Evolutionary Biology (with 2 courses scheduled to be introduced in the near future). Steady offerings of past courses in addition to the planned introduction of additional graduate courses in ecology and evolutionary biology suggest a diverse catalogue of options for students enrolled in the Concentration in Ecology and Evolutionary Biology within the QSB doctoral program.

Schedule of EEB graduate course offerings between Fall 2015 - Spring 2020

Ecology	**F15**	**S16**	**F16**	**S17**	**F17**	**S18**	**F18**	**S19**	**F19**	**S20**
QSB 218			x				x			
QSB 245			x							
QSB 246	x					x				x
QSB 248				x						
QSB 256					x				x	
Evol. Biol.	**F15**	**S16**	**F16**	**S17**	**F17**	**S18**	**F18**	**S19**	**F19**	**S20**
QSB 230	x						x			
QSB 244					x		x			x
QSB 245			x				x			
QSB 247							x			
QSB 257				x					x	

5. Revised Graduate Group Catalog Copy

(Changes in red)

Quantitative and Systems Biology,

Ph.D. Program Description

qsb.ucmerced.edu

Graduate Program Chair: Miriam Barlow

Graduate Group Coordinator: Paul Roberts

Please direct inquiries to qsb.inquiries@ucmerced.edu

The Quantitative and Systems Biology Program QSB is a unified biology program whose unique strength lies in co- training students from all backgrounds in science and engineering to communicate across scientific boundaries to address complex questions and problems in basic and applied life sciences, while mastering core skills and disciplines. QSB faculty at UC Merced, Lawrence Livermore National Lab, and the DOE Joint Genome Institute represent 17 disciplinary strengths organized under four areas:

1. Molecular and Cell Biology
    - Biochemistry and Molecular Biology • Cell and Developmental Biology
    - Microbiology and Immunology
    - Neurobiology
    - Physiology
2. Ecology and Evolutionary Biology
    - Molecular Evolution and Ecology
    - Microbial Ecology and Genomics
    - Organismal and Integrative Biology
    - Population Ecology, Genetics and Genomics
3. Systems and Synthetic Biology • Molecular Systems Biology
    - Systems Ecology
    - Synthetic Biology
4. Quantitative Biology and Bioinformatics • Mathematical Biology
    - Computational Biology
    - Physical Biology
    - Structural Biology
    - Bioinformatics

QSB is actively recruiting doctoral and masters students with basic training and experience in at least one or more core research skills such as laboratory work, fieldwork, mathematical modeling, statistics or computer programming. QSB supports both rotations in the first-year and

the possibility to enter the program directly into one faculty's lab, or for students to arrange co-advisement among multiple QSB faculty. QSB students can take advantage of a wide diversity of support mechanisms for research opportunities and professional development, including Semester Research Fellowships, Conference Travel Award Accounts, Summer Research Fellowships, Recruitment Travel Awards and the Joint Genome Institute/UC Merced Genomics Distinguished Graduate Internship Program.

Concentrations

QSB offers Concentrations in specialized fields of biology. Students enrolling in a concentration will take courses aimed towards specialized skill development, and the degree conferred will include the concentration. Current concentrations offered are:

- Molecular and Cellular Biology. Students will develop scholarship, teaching and research ability in one or more areas of Molecular and Cell Biology broadly defined, including biochemistry, molecular biology, cell biology, developmental biology, immunology, microbiology, neurobiology, and/or physiology.
- Ecology and Evolutionary Biology. Students will develop scholarship, teaching and research ability in both Ecology and Evolutionary Biology broadly defined, including community ecology, biogeography, phylogenetics and/or evolutionary and ecological dynamics.

Prospective applicants can view instructions on how to apply for graduate studies in QSB at the website, qsb.ucmerced.edu.

Ph.D. Program Learning Outcomes

1. Quantitative and Systems Biology Skill (QB/SB)–Knowledge and understanding of quantitative (statistical, computational, and model dependent) and high-throughput experimental systems approaches to biological problems, and demonstrated ability to conceive, plan, execute and/or interpret the applications of these approaches to research questions.

2. Ethics–Knowledge and understanding of ethical standards in proposing and executing professional scientific research.

3. Teaching/Communication–Ability to effectively assist in the teaching of science in a classroom environment, and engage in effective communication of original and existing scientific inquiry and results orally and in writing.

4. Scholarship–Ability to undertake and demonstrate original graduate level scholarship in specialized areas of biology, including integrative command of historical and current literature and broader scientific context, and identification of open research problems.

5. Research Ability–Ability to propose and defend a feasible research plan to apply scientific techniques to open research problems and execute, complete and defend original research that advances scientific knowledge.

6. Revised Graduate Group Website Copy

http://qsb.ucmerced.edu/join-us/qsb-degrees

(Text on Website will be updated as follows; new text in red)

The Quantitative and Systems Biology Program takes advantage of advances in techniques and theory that bridge molecular and ecosystem scales toward the reunification of biology as a field. Biologists' ability to gather and integrate large amounts of quantitative data in field and laboratory settings is advancing hand-in-hand with theory and modeling to better explain and more successfully engineer the nature and diversity of living systems on Earth.

The Quantitative and Systems Biology Graduate Program at UC Merced provides individualized, research- based courses of study leading to M.S. and Ph.D. degrees. Research projects are available on diverse topics including:

- biomolecular interactions
- genomics and proteomics
- microbial community and host-microbial interactions
- cellular interactions in immune, neural and developmental networks; signal transduction
- organ systems and whole animals (both vertebrate and invertebrate)
- comparative ecology, evolution, and organismal biology
- computational biology

Because of the interdisciplinary nature of the program and faculty, research projects often span multiple topics to address complex questions and linkages across levels of biological scale (e.g. molecules, cells, organisms, communities) typical of systems biology and quantitative biology (e.g. measuring individuals to describe populations). Coursework in this graduate program provides a background in the tools of modern biology, including computational biology, genomics and advanced instrumentation. The Quantitative and Systems Biology Program offers particular opportunities for students interested in multidisciplinary projects at the interface of biology with other disciplines, including computer science and bioengineering. Career opportunities for graduates include research positions in government and industry, as well as academic positions at colleges and universities.

Concentrations

QSB offers Concentrations in specialized fields of biology. Students enrolling in a concentration will take courses aimed towards specialized skill development, and the degree conferred will include the concentration. Current concentrations offered are:

- Molecular and Cellular Biology
- Ecology and Evolutionary Biology

Ph.D. in Quantitative and Systems Biology

Doctoral Program Learning Outcomes

1. Quantitative and Systems Biology Skill–Knowledge and understanding of quantitative (statistical, computational, and model dependent) and high-throughput experimental systems approaches to biological problems, and demonstrated ability to conceive, plan, execute and/or interpret the applications of these approaches to research questions.

2. Ethics–Knowledge and understanding of ethical standards in proposing and executing professional scientific research.

3. Teaching/Communication–Ability to effectively assist in the teaching of science in a classroom environment, and engage in effective communication of original and existing scientific inquiry and results orally and in writing.

4. Scholarship–Ability to undertake and demonstrate original graduate level scholarship in specialized areas of biology, including integrative command of historical and current literature and broader scientific context, and identification of open research problems.

5. Research Ability–Ability to propose and defend a feasible research plan to apply scientific techniques to open research problems and execute, complete and defend original research that advances scientific knowledge.

M.S. in Quantitative and Systems Biology

Masters Program Learning Outcomes

Plan 1 – Thesis

1. Quantitative and Systems Biology Skill–Knowledge and understanding of quantitative (statistical, computational, and model dependent) and high-throughput experimental systems approaches to biological problems.

2. Ethics–Knowledge and understanding of ethical standards in proposing and executing professional scientific research.

3. Communication–Ability to effectively engage in effective communication of original and existing scientific inquiry and results orally and in writing.

4. Scholarship–Ability to demonstrate graduate-level scholarship in specialized areas of biology, including command of relevant literature.

5. Research Ability–Ability to execute and defend original research that contributes to knowledge in the relevant field of biology.

Plan II – Non- Thesis

1. Quantitative and Systems Biology Skill–Knowledge and understanding of quantitative (statistical, computational, and model dependent) and high-throughput experimental systems approaches to biological problems.

2. Ethics–Knowledge and understanding of ethical standards in proposing and executing professional scientific research.

3. Communication–Ability to engage in effective communication of original and existing scientific inquiry and results orally and in writing.

4. Scholarship–Ability to undertake and demonstrate original graduate level scholarship in specialized areas of biology, including command of historical and current literature and broader scientific context, identification of open research problems, and identification of feasible techniques to approach those problems.

7. Revised/New and Complete Course Request Form Packet(s)

No new courses will be created at this time.

8. Letter of support from the Lead Dean and affected graduate groups

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5200 North Lake Road
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(209) 228-4723
(209) 228-6906 - Fax

January 4, 2019

Professor LeRoy Westerling, Chair
Graduate Council
UC Merced

Dear Chair Westerling,

I have reviewed the request by the faculty of Quantitative & Systems Biology (QSB) to establish a formal Concentration in Ecology and Evolutionary Biology (EEB), consistent with the Graduate Council's March 2, 2016 Policy on Concentrations and Designated Emphases. Concentrations are elective and appear on the student's diploma. I am pleased to support this request.

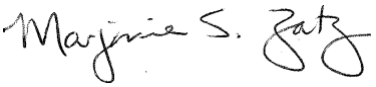
Quantitative and Systems Biology is a very strong and rapidly growing graduate program with 106 Ph.D. students as of Fall 2018. The program anticipates enrollment of 130 Ph.D. students in Fall 2019, growing to 170 Ph.D. students by 2023. QSB students are highly competitive, as evidenced by the number of students awarded prestigious NSF Graduate Research, Ford Foundation, NIH, and DOE fellowships over the past few years. QSB students focus their research training in a number of specialty areas, and the faculty would like to recognize the unique training offered in Ecology and Evolutionary Biology through a formal concentration. This is the second requests for Concentrations within QS. The first concentration, in Molecular and Cellular Biology, was approved in 2017.

The Concentration in Ecology and Evolutionary Biology will prepare students with the knowledge and practice of experimental and computation biology skills necessary for the study of genetics, organisms, populations, and ecosystems. It will provide training in community ecology, biogeography, phylogenetics, molecular evolution, and evolutionary and ecological dynamics. Tracking student concentration data may require some effort, but should be relatively straightforward with the Graduate Reporting Information Platform (GRIP).

The concentration approach proposed by QSB will ensure that students receive training in the interdisciplinary breadth of the larger QSB program while also demonstrating their specialized training in their area of concentration. The requirements for the Concentration are thoughtful and are consistent with policy. The faculty believe that this Concentration will attract new graduate students interested in ecology and evolutionary biology, provide appropriately focused research training, and provide documentation of methodological and analytical training that will appeal to future employers. Sufficient course offerings exist to offer the Concentration, and more are being developed. No other resources are required to offer the Concentration.

For all of these reasons, I am pleased to provide my support for this request. Please feel free to contact me if you have questions or require additional information.

Sincerely yours,



Marjorie S. Zatz
Vice Provost and Graduate Dean
Professor of Sociology

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UNIVERSITY OF CALIFORNIA, MERCED
5200 N LAKE RD,
MERCED, CA 95343

TO: Chair Westerling, Graduate Council

FROM: Erin Webb, University Registrar

RE: Review of Proposal for EEB Concentration in QSB Program

DATE: January 16, 2018

Thank you for the opportunity to review the proposal for an Ecology and Evolutionary Biology (EEB) concentration in Quantitative Systems and Biology graduate degree program.

To align with the procedures for establishing a new concentration, the word “diploma” should be changed to “transcript” on page two of the proposal. Diploma is also referenced in the letter from QSB Chair Miriam Barlow, on page seven.

The student transcript is the most authoritative and secure way to verify degree conferral and, as such, is where UC Merced includes information about concentrations. Concentrations are not included on the diploma.

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School of Natural Sciences
UNIVERSITY OF CALIFORNIA, MERCED
5200 NORTH LAKE ROAD
MERCED, CALIFORNIA 95344

To: Graduate Council, University of California, Merced
From: Miriam Barlow, Associate Professor & Quantitative Systems Biology Chair
Date: February 11, 2018
Subject: Ecology and Evolutionary Biology Concentration for Quantitative Systems Biology

In response to Graduate Council's policy on Concentrations and Designated Emphases Policy dated March 2, 2016, the Quantitative and Systems Biology (QSB) graduate program proposes to establish a new Concentration of the QSB doctoral degree, to be named as follows:

- Concentration in Ecology and Evolutionary Biology

Concentrations are elective and appear on the diploma of students who elect them. The included proposal details the proposed curricular requirements of this new concentration in QSB.

Concentration Description:
The goal of the Ecology and Evolutionary Biology Concentration is to equip students with knowledge and practice of the experimental and computation biology skills to study genetics, organisms, populations, and ecosystems. It also helps students build a solid scientific foundation and philosophical outlook that prepares them to tackle the challenges of cutting edge biological research. The Ecology and Evolutionary Biology

concentration provides training in community ecology, biogeography, phylogenetics, molecular evolution and/or evolutionary and ecological dynamics
.

Rationale:
1) Provide training in experimental ecology and evolutionary biology.
2) Attract new graduate students interested in ecology and evolutionary biology.
3) Provide documentation of training in experimental, theoretical and computational biology methods that will appeal to potential future employers of QSB program graduates, for example the biotechnology industry.

Need:
The Ecology and Evolutionary Biology concentration will help faculty in QSB attract and train students interested in these topics. It will also help in the development of metrics for assessing student cohort outcomes and needs.

Potential Resource Implications:
There will be a slight increase in effort for tracking student data, but the overall increased efficiency resulting from this stratification will likely mitigate this effort. We also anticipate increased applications to the QSB graduate program, potentially requiring expanded on-campus interviews (for example during Graduate Visitation Weekend). The Ecology and Evolutionary Biology concentration may help increase the number and quality of enrolled QSB students. No additional resource requirements are anticipated.

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SCHOOL OF NATURAL SCIENCES

University of California, Merced
5200 N. Lake Road
Merced, CA 95343

To: Leroy Westerling, Chair, Graduate Council

From: Betsy Dumont, Dean, School of Natural Sciences

CC: Miriam Barlow-MCB Grad Chair, Peggy O'Day- LES Department Chair, Rudy Ortiz-MCB Department Chair, Justin Yeakel-Assist Prof, LES, Majorie Zatz-VP and Dean, Graduate Education

Date: September 4, 2018

Re: Ecology and Evolutionary Biology Concentration

I am pleased to write this letter of support for the Ecology and Evolutionary Biology (EEB) concentration proposal in the Quantitative Systems Biology (QSB) graduate program. QSB is the largest graduate group at UC Merced, with 56 faculty and [76] active students. The graduate program has catalyzed numerous cross-disciplinary collaborations, thesis committees, and projects, and while its breadth is one of its strengths, it also carries some unique challenges.

Given the breadth of QSB, one of the greatest challenges is to balance the vision of inter- and cross-disciplinary training and common courses taken by all QSB students against the demand for more specialized coursework directly related to the sub-disciplines from which QSB is composed. The proposed EEB concentration will be the second concentration established in QSB, the first being Molecular and Cellular Biology (MCB). Adding to the catalogue of available concentrations within QSB will bring the advantages inherent to concentrations to a larger contingent of QSB students.

I support the implementation of the EEB concentration that was developed in consultation with the QSB Executive Committee and QSB faculty. The EEB concentration will help focus the QSB research areas while maintaining its unifying advantages as an umbrella graduate group. QSB degree concentrations will allow the program to diversify how it promotes, recruits, and trains students in the program and, if managed carefully, should maintain QSB's strength and interdisciplinarity. Having an EEB concentration also will enable QSB faculty to better anticipate course demand.

I would like to offer the observation that establishing concentrations is often a stepping stone toward creating independent programs, be they graduate or undergraduate. This is a neutral comment intended simply to urge QSB to develop a clear 5-10 vision for the program and to work intentionally toward implementing it.

In summary, I believe that the EEB concentration, in concert with the currently implemented MCB concentration, has the potential to improve student recruitment, retention, and professional advancement, while simultaneously enhancing individual and collaborative faculty research programs.

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ACADEMIC SENATE, MERCED DIVISION
COMMITTEE ON ACADEMIC PLANNING AND RESOURCE ALLOCATION
JESSICA TROUNSTINE, CHAIR
jtrounstine@ucmerced.edu

UNIVERSITY OF CALIFORNIA, MERCED
5200 NORTH LAKE ROAD
MERCED, CA 95343

January 11, 2019

To: Kurt Schnier, Chair, Division Council

From: Committee on Academic Planning & Resource Allocation (CAPRA)

Re: QSB Concentration Proposal

At its January 10 meeting, CAPRA reviewed the proposal from the Quantitative and Systems Biology (QSB) graduate group to create a concentration in Ecology and Evolutionary Biology (EEB). We endorse the proposal and offer the below analysis.

The proposed EEB concentration would be the second concentration in QSB; a concentration in Molecular and Cellular Biology was introduced in 2017.

QSB is a large and extremely diverse graduate group that would normally be divided among multiple departments or graduate programs in most universities. This breadth has presented challenges for both recruiting graduate students and educating them. The faculty who identify QSB as their primary home come almost entirely from two departments in SNS, Molecular Cell Biology (MCB) and Life and Environmental Sciences (LES). The existing Molecular and Cellular Biology concentration aligns with MCB while the proposed EEB concentration aligns somewhat less completely with LES. For this reason, establishment of the second concentration makes sense.

The proposed concentration is expected, at least initially, to use courses that are already offered by QSB on a semi-regular basis. Therefore, there is no reason why students with research interests in ecology and/or evolutionary biology cannot already pursue a desired curriculum without any need to establish a new concentration. However, establishment of the concentration may be helpful in recruiting students with such interests to the program, as the QSB title does not obviously suggest a program that would be appropriate to students in ecology or evolutionary biology. As the coursework requirements for the EEB concentration are slightly greater than for the "bare" QSB program (one additional course), it is not clear how many students would opt to declare the concentration in order to have it appear on their transcripts. However, even if few students choose the concentration, its existence should be helpful to faculty in this area trying to recruit quality graduate students.

The resource implications appear minor. While graduate course offerings in ecology and evolutionary biology have been sparse, they are adequate to deliver the concentration. If the result is to attract more QSB graduate students they will require additional resources in the form of lab and office space and grant or TA support, but

growth of our graduate programs is a campuswide goal. CAPRA sees no difficulties with this proposed concentration and recommends it move forward in the approval process.

cc: Senate Office

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MERCED, CALIFORNIA 95344

To: Graduate Council, University of California, Merced
From: Miriam Barlow, Associate Professor & Quantitative Systems Biology Chair
Date: February 11, 2018
Subject: Ecology and Evolutionary Biology Concentration for Quantitative Systems Biology

In response to Graduate Council's policy on Concentrations and Designated Emphases Policy dated March 2, 2016, the Quantitative and Systems Biology (QSB) graduate program proposes to establish a new Concentration of the QSB doctoral degree, to be named as follows:

- Concentration in Ecology and Evolutionary Biology

Concentrations are elective and appear on the diploma of students who elect them. The included proposal details the proposed curricular requirements of this new concentration in QSB.

Concentration Description:
The goal of the Ecology and Evolutionary Biology Concentration is to equip students with knowledge and practice of the experimental and computation biology skills to study genetics, organisms, populations, and ecosystems. It also helps students build a solid scientific foundation and philosophical outlook that prepares them to tackle the challenges of cutting edge biological research. The Ecology and Evolutionary Biology

concentration provides training in community ecology, biogeography, phylogenetics, molecular evolution and/or evolutionary and ecological dynamics
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Rationale:
1) Provide training in experimental ecology and evolutionary biology.
2) Attract new graduate students interested in ecology and evolutionary biology.
3) Provide documentation of training in experimental, theoretical and computational biology methods that will appeal to potential future employers of QSB program graduates, for example the biotechnology industry.

Need:
The Ecology and Evolutionary Biology concentration will help faculty in QSB attract and train students interested in these topics. It will also help in the development of metrics for assessing student cohort outcomes and needs.

Potential Resource Implications:
There will be a slight increase in effort for tracking student data, but the overall increased efficiency resulting from this stratification will likely mitigate this effort. We also anticipate increased applications to the QSB graduate program, potentially requiring expanded on-campus interviews (for example during Graduate Visitation Weekend). The Ecology and Evolutionary Biology concentration may help increase the number and quality of enrolled QSB students. No additional resource requirements are anticipated.

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SCHOOL OF NATURAL SCIENCES

University of California, Merced
5200 N. Lake Road
Merced, CA 95343

To: Leroy Westerling, Chair, Graduate Council

From: Betsy Dumont, Dean, School of Natural Sciences

CC: Miriam Barlow-MCB Grad Chair, Peggy O'Day- LES Department Chair, Rudy Ortiz-MCB Department Chair, Justin Yeakel-Assist Prof, LES, Majorie Zatz-VP and Dean, Graduate Education

Date: September 4, 2018

Re: Ecology and Evolutionary Biology Concentration

I am pleased to write this letter of support for the Ecology and Evolutionary Biology (EEB) concentration proposal in the Quantitative Systems Biology (QSB) graduate program. QSB is the largest graduate group at UC Merced, with 56 faculty and [76] active students. The graduate program has catalyzed numerous cross-disciplinary collaborations, thesis committees, and projects, and while its breadth is one of its strengths, it also carries some unique challenges.

Given the breadth of QSB, one of the greatest challenges is to balance the vision of inter- and cross-disciplinary training and common courses taken by all QSB students against the demand for more specialized coursework directly related to the sub-disciplines from which QSB is composed. The proposed EEB concentration will be the second concentration established in QSB, the first being Molecular and Cellular Biology (MCB). Adding to the catalogue of available concentrations within QSB will bring the advantages inherent to concentrations to a larger contingent of QSB students.

I support the implementation of the EEB concentration that was developed in consultation with the QSB Executive Committee and QSB faculty. The EEB concentration will help focus the QSB research areas while maintaining its unifying advantages as an umbrella graduate group. QSB degree concentrations will allow the program to diversify how it promotes, recruits, and trains students in the program and, if managed carefully, should maintain QSB's strength and interdisciplinarity. Having an EEB concentration also will enable QSB faculty to better anticipate course demand.

I would like to offer the observation that establishing concentrations is often a stepping stone toward creating independent programs, be they graduate or undergraduate. This is a neutral comment intended simply to urge QSB to develop a clear 5-10 vision for the program and to work intentionally toward implementing it.

In summary, I believe that the EEB concentration, in concert with the currently implemented MCB concentration, has the potential to improve student recruitment, retention, and professional advancement, while simultaneously enhancing individual and collaborative faculty research programs.

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OFFICE OF PERIODIC REVIEW, ASSESSMENT, AND ACCREDITATION SUPPORT

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5200 NORTH LAKE ROAD
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Date: January 23, 2019

To: LeRoy Westerling, Chair, Graduate Council

From: Kerry Clifford, Interim Director, Office of Periodic Review, Assessment, and Accreditation Support

Re: Review Request Proposal for EEB Concentration in QSB Program

Thank you for the opportunity to review Quantitative and Systems Biology's proposal for a concentration in Ecology and Evolutionary Biology. I have consulted with Accreditation Liaison Officer Laura Martin, and we agree that the proposed alterations do not result in a significantly different[1] program for accreditation purposes. As such, the program can be implemented, without WSCUC review, following completion of the campus approval process.

cc: Academic Senate Office

[1] Changes of 25% or more in the curriculum, in the length of the program, or to the delivery methods.