

**RECOMMENDATION TO CREATE THE DEPARTMENT OF  
CELL AND REGENERATIVE BIOLOGY AND THE DEPARTMENT OF NEUROSCIENCE  
IN THE SCHOOL OF MEDICINE AND PUBLIC HEALTH**

The School of Medicine and Public Health (SMPH) at UW-Madison proposes a new Department of Cell and Regenerative Biology and a new Department of Neuroscience, to be formed by the dissolution of the departments of anatomy and physiology and subsequent realignment of participating faculty and staff and existing courses.

The process to create these two new departments was initiated in September 2009 with the formation of a review committee composed of faculty from the affected departments as well as from other departments in the school. This recommendation has been approved by the respective departments, the SMPH Academic Planning Council, and the University Academic Planning Council. Pursuant to *Faculty Policies and Procedures* 5.01.A., it is presented to the Faculty Senate for discussion.

**Department of Cell and Regenerative Biology**

By forming the Department of Cell and Regenerative Biology, outstanding research that already exists in the School of Medicine and Public Health will be strengthened through alignment of faculty, now dispersed across several departments, by development of interdisciplinary programs of research and by recruitment of new faculty in nascent or under-represented areas of research. The new department will strive to maintain and develop leadership and excellence in multiple research areas, work to develop research themes that span traditional research field boundaries, and participate in campus programs of interdisciplinary and translational research. To achieve excellence and leadership in teaching, the department will emphasize teaching as a fundamental and important responsibility of each faculty member, strive to ensure that each faculty member is involved in teaching that is most appropriate to their skills and interests, and work with other departments and faculty to develop integrated, interdisciplinary approaches to teaching. As a key element for achieving success in its research and teaching programs, the department will sustain vigorous programs of graduate and post-doctoral training in molecular, cellular, developmental and systems biology; training programs will incorporate interdisciplinary approaches to problems involving fundamental biological processes, alterations of these processes in human disease, and/or development of therapeutic interventions in the treatment of disease.

Research

The Department of Cell and Regenerative Biology will be committed to understanding the fundamental mechanisms of how living systems operate at the cellular and molecular levels of organization. By embracing a wide range of contemporary and emerging approaches and experimental systems, we seek to define signaling and regulatory pathways that provide the basis for understanding, diagnosis and treatment of human disease.

Basic research is the centerpiece of the department and serves as the driving force behind teaching and training efforts. The overarching research interests of the department are highly interdisciplinary, emphasizing molecular, cellular and systems approaches to describe biological processes in molecular terms. To maintain its excellence and stature, the department will initially focus on existing strengths in four research areas:

*Molecular and Cell Biology:* The multidisciplinary molecular and cell biology group studies molecular mechanisms that underlie normal and stress-induced cellular processes. Specific areas of focus include: (i) signaling pathways relevant to cancer; (ii) molecular mechanisms that regulate gene expression during cell differentiation; (iii) extracellular controls of cellular behavior; (iv) identification and characterization of drugable targets for human diseases; and (v) mechanisms of action of drugs in biological systems.

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*Cardiovascular Biology:* The multidisciplinary cardiovascular biology group studies numerous aspects of cardiac function and development. Specific areas of focus include: (i) mechanisms of embryonic cardiovascular development and perturbations leading to birth defects and adult heart disease; (ii) molecular mechanisms modulating myocardial contraction, disruptions of which lead to heart failure or inherited cardiomyopathies; (iii) human tissue and animal models of heart and vascular disease; (iv) mechanisms of membrane excitability, arrhythmogenesis and sudden cardiac death.

*Developmental Biology:* The developmental biology group uses whole animal systems to study the molecular basis of organ and tissue development. Specific areas of focus include: (i) development of olfactory and auditory organs; (ii) development of the embryo; (iii) development of the eye; (iv) development of the heart; (v) development of the hematopoietic and vascular systems; and (vi) development of the liver.

*Stem Cell and Regenerative Biology:* The stem cell and regenerative biology group is closely aligned with the Developmental Biology group and studies how development elaborates and aging dissipates the cellular patterning of humans. Specific areas of focus include: (i) mechanisms that restrict the developmental potential of pluripotent stem cells to specific lineages; (ii) mechanisms that underlie reversal of cell differentiation states; and (iii) mechanisms of interconversion between stable cell differentiation states.

Strategies to advance research in the department will include: (1) emphasizing both intercellular and intracellular signaling as themes to link the research focuses of the department; (2) developing seminars that enhance communication between faculty and trainees; (3) developing shared research facilities; (4) participating in interdisciplinary research and training programs; (5) participating in translational research in collaboration with clinical programs; and (6) hiring faculty that will further strengthen focal areas or, when appropriate to the research or teaching missions of the department, appointing individuals in other SMPH or campus departments as either primary or affiliate faculty, actions which require approval by the executive committees of the involved departments.

### Teaching

The new department will promote outstanding teaching in order to meet the needs of medical students, graduate students, and undergraduates. Faculty will be expected to teach regularly and effectively in at least one of the teaching programs of the department and will be encouraged to teach in interdisciplinary courses as part of the medical curriculum, graduate training programs, or undergraduate programs such as Biocore. Faculty will be encouraged to support the department and their colleagues by working together to improve the quality and effectiveness of teaching and to enhance both the continuity and interdisciplinary nature of course content.

Faculty will participate in disciplinary teaching that has been the responsibility of the former departments of anatomy and physiology or the continuing Department of Pharmacology. The interests of disciplinary teaching will be represented by the department, where appropriate, but will otherwise be advocated by inter-departmental teaching groups in anatomy, cell structure and function, and physiology. These formal teaching groups will be composed of faculty who teach in medical student and undergraduate survey courses in each of these disciplines and will be headed by a faculty member appointed by the dean or the dean's designee. Teaching group leaders will serve as advocates for disciplinary teaching in planning and implementing courses and in working with chairs and deans to ensure that the need for teachers, teaching assistants and financial resources are met.

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### Graduate and Post-doctoral Training

Initially, department faculty will participate in ~20 existing interdisciplinary and/or interdepartmental graduate programs. These programs include cellular and molecular biology, molecular and cellular pharmacology, and physiology. Over the first five years from its inception, the department intends to develop a vigorous new program and national leadership in the training of graduate students and post-doctoral trainees in molecular, cellular, developmental and systems biology and related areas. During this period, the faculty intends to create a new graduate program that emphasizes one or more focus areas of the department, e.g., developmental biology or systems biology that is/are not currently represented in campus doctoral training programs. To be successful, the program must be well organized and should clearly delineate requirements and expectations for students. Faculty will strive to increase the quality and number of students and post-doctoral trainees in the department, place Ph.D. graduates in post-doctoral positions that will facilitate ultimate entry into appropriate career tracks, and provide mentoring to Ph.D. students and post-doctoral trainees with respect to career development.

Faculty will work both within the department and in interdisciplinary programs to develop alternative career opportunities for our Ph.D. graduates. For example, in preparation for careers in liberal arts colleges or in curriculum development, students will be provided options to obtain a graduate minor or a master's degree in education. Another possibility will be to improve connections to the pharmaceutical or medical equipment industries either through faculty collaborations or student internships.

### **Department of Neuroscience**

The formation of a Department of Neuroscience will consolidate the strengths in research and teaching in neuroscience, an important area of biomedical research within the School of Medicine and Public Health. The Department of Neuroscience will bring together neuroscientists from what are now two departments, anatomy and physiology. Faculty in these departments hold strengths in complementary research areas. The new department will strive for excellence in research. An important goal is to bring together investigators studying fundamental processes and to use the information obtained to develop therapeutic interventions in the treatment of human disease. By bringing together faculty who have common interests, or who use common techniques, equipment and expertise, resources can more easily be shared and cooperative ventures catalyzed.

Success in research also requires excellence in teaching. To this end, the Department of Neuroscience will sustain a vigorous program of post-doctoral, graduate, medical, and undergraduate training. Prospective graduate students will be recruited through various interdisciplinary training programs including, but not limited to, the Neuroscience Training Program, the Biophysics Training Program, the Cell and Molecular Biology Training Program, and the Molecular and Cellular Pharmacology Program. The new department will serve the Neuroscience Training Program by providing trainers and contributing faculty to teach neuroscience courses. Faculty in the departments of anatomy and physiology have a strong tradition of teaching medical students as well as graduate and undergraduate students. This tradition will be made more effective by integrating information from both disciplines. The new Department of Neuroscience will strive to ensure that each of its faculty is involved in teaching that is most appropriate to their skills and interests. It will work with other departments and with neuroscientists in other schools on campus to develop integrated, interdisciplinary approaches to teaching.

When appropriate to the mission of the department, individuals in other departments within the SMPH as well as in other schools may be considered for appointment as joint or affiliate faculty. Such actions require approval by the executive committees of the involved departments.

In summary, formation of the Department of Neuroscience in the SMPH will enhance scientific collaborations by restructuring the research environment and will advance teaching of medical, graduate and undergraduate students.

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### Research

A central goal of the new department is to build interrelated research strengths. This will catalyze formation of a critical mass of investigators whose interactions will lead to collaborative research projects. There are already several such groups within the existing departments. For example, the Department of Anatomy has a group of faculty with strong research programs in developmental neuroscience and another group of sensory physiologists known for their work at the systems level. The Department of Physiology has strong research groups in synaptic physiology and in sensory physiology. In the past there have been both formal and informal interactions between sensory neuroscientists in the two departments; in the new department these interactions are likely to increase and strengthen. This will result from increased casual and formal interactions and importantly from a strongly emphasized departmental seminar series in which diverse viewpoints arising from different research strengths will be discussed. Bringing together faculty with these different interests and areas of expertise will also promote the formation of new research groups involving members of other departments.

The new department will allow and encourage more systematic hiring to target areas of need in neuroscience on our campus. This will involve hiring to existing strengths in the department, to increase the concentrations in these areas, and will also allow the planned development of new areas of neuroscience research on campus.

### Teaching

Another central goal of the new department is to promote excellent teaching that meets the needs of medical students, graduate students, and undergraduates. Every faculty member will be expected to teach regularly and effectively and to share teaching duties equitably. Initially faculty will be expected to continue to teach in those courses to which they are already committed. The departments of physiology and anatomy are at present committed to teaching a wide range of courses to medical, graduate, and undergraduate students that are integral to the medical curriculum and to graduate and undergraduate training programs. As in any department or training program, courses in the new Department of Neuroscience will evolve and change. Faculty will be encouraged to support their colleagues within the department, within the SMPH, and in the larger neuroscience community by working together to improve the quality and effectiveness of teaching. The department will be able to strengthen teaching of the medical curriculum as well as that of multiple graduate and undergraduate programs.

Faculty in the Department of Neuroscience will participate in disciplinary teaching that has been the responsibility of the former departments of anatomy and physiology. The interests of disciplinary teaching will be represented by the Department of Neuroscience, where appropriate, but will otherwise be represented by inter-departmental teaching groups in anatomy, neuroscience and physiology. These formal teaching groups will be composed of faculty who teach in medical student and undergraduate survey courses in each of these disciplines and will be headed by a faculty member appointed by the dean or the dean's designee. Teaching group leaders will serve as advocates for disciplinary teaching in planning and implementing courses and in working with chairs and deans to ensure that the need for teachers, teaching assistants and financial resources are met. Some of the courses formerly administered by the departments of anatomy and physiology will be administered by the Department of Neuroscience, but faculty teaching responsibilities may extend to courses administered by other departments. Teaching assignments will be made by the chair of the department in consultation with the teaching group leaders and with each faculty member. The chair may elect to appoint a Teaching Assignment Committee, which would recommend teaching assignments for the chair's consideration. The assignment of teaching to faculty will be as equitable as is feasible given the variable nature of teaching among courses.

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### Graduate and Post-doctoral Training

Excellence in graduate and post-doctoral training is tied to excellence in research programs and the research environment. It is essential that the new department faculty participate vigorously in graduate and post-doctoral training. Faculty will strive to increase the quality and number of students and post-doctoral trainees in the department, to place Ph.D. graduates in post-doctoral positions that facilitate entry into appropriate career tracks, and to provide mentoring to Ph.D. students and post-doctoral trainees with respect to career development. Rather than competing with existing graduate training programs, the new department will enhance existing interdepartmental graduate training programs. The Physiology Graduate Training Program at present is based in the physiology department but includes trainers from other departments. The Physiology Graduate Training Program will continue as an interdepartmental training program. As they do now, faculty in the new department are expected to recruit graduate students from existing inter-departmental graduate programs. These include the molecular and cellular pharmacology, cell and molecular biology, biophysics, physiology and neuroscience training programs. Having a critical mass of neuroscientists in one department will also enable the development of competitive proposals for NIH and NSF center grants and pre- and post-doctoral training grants.

The Department of Neuroscience will be independent from the Neuroscience Training Program (NTP) but will strengthen it. The NTP is one of the top neuroscience training programs in the country and has served the campus for over 30 years. The NTP faculty is composed of 93 trainers from 22 basic science and clinical departments and currently trains over 60 students. The program draws excellent students from around the country in part due to its diversity. It also provides a venue for neuroscientists across campus to interact on a regular basis. It is essential that the NTP continues to serve the campus as a whole and that it remains independent of the new department. The existence of a Department of Neuroscience will enhance the Neuroscience Training Program. Even now the faculty of the new department contributes a substantial part of the teaching in the required and elective courses in the NTP. With the formation of a Department of Neuroscience, faculty will be encouraged to improve, coordinate and develop new courses for graduate and undergraduate students. In addition, since the NTP is not a department and cannot hire new faculty, the campus has been dependent upon non-neuroscience departments to address areas of under-representation in the field. Thus, new faculty hired within the Department of Neuroscience will add strength to the training program as well as the department.

### Anticipated Impact/Interactions

The impact of a new Department of Neuroscience on the SMPH and on the campus will be profound for the field at this university and for its national reputation. Neuroscience is an important field that has grown enormously over the past several decades but that has not been effectively represented in the SMPH. Neuroscience is strongly interdisciplinary and is represented on campus through many disparate departments. Even within the SMPH, the neuroscience community is distributed in the departments of anatomy, physiology, psychiatry, neurology, ophthalmology and visual sciences, and pathology. The new department will provide a focus for this important area of research and will help to represent research areas that need a critical mass or that are under-represented on campus. The new department will be better poised to serve the SMPH and the campus in the teaching of neuroscience. In the past decade, curricula in medicine and in the biological sciences have begun to drift away from classical disciplines (anatomy, physiology, biochemistry, etc.) toward more interdisciplinary and integrated course work. With most of the faculty in one department, coordination of interdisciplinary teaching will be enhanced.

It has been the long-term goal of many faculty on our campus to have a Department of Neuroscience. The need for campus-wide coordination in neuroscience was recognized two decades ago by the formation of a Center for Neuroscience. Faculty members of the two departments are optimistic and excited about this opportunity to create a new entity that brings scientific disciplines together. The reorganization will obviously have a strong impact on present members of the departments of physiology and anatomy, and the

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new department is fortunate to be served by an administrative office staff that has already experienced a previous restructuring—the merging of the departments of physiology and neurophysiology. We anticipate that a new chair recruited from a national search will energize and strengthen the research effort in neuroscience within the department as well as across campus.