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November 16, 2015

To: School of Education Dean's Office and Programs Committee

From: Janet Branchaw, WISCIENCE Faculty Director

A handwritten signature in black ink that reads "Janet Branchaw".

Re: Integrated Science subject listing proposal

On November 9, 2015, the WISCIENCE Executive Committee unanimously approved the attached proposal to establish an Integrated Science subject listing for WISCIENCE courses. On behalf of the Executive Committee and the Institute, we respectfully request that the Programs Committee consider including this new subject listing in the School of Education's Timetable.

Contact person:

Janet Branchaw, WISCIENCE Faculty Director
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Proposal to Establish Integrated Science Subject Listing

The Wisconsin Institute for Science Education and Community Engagement (WISCIENCE) requests approval to establish the Integrated Science subject listing to house the WISCIENCE courses that are currently being offered through the Biology subject listing. In July 2014, the University Academic Planning Council approved a proposal to transform the Institute for Biology Education (IBE) into WISCIENCE and to broaden the mission of the institute to the natural sciences. As part of this transition, responsibility for the Biology subject listing was transferred from WISCIENCE to the College of Letters and Sciences and the scope of the Biology subject listing has been narrowed to serve only the Biology major. As a next step in the transition, we propose to establish the Integrated Science subject listing to house the WISCIENCE courses, which include cross-campus science and educator professional development courses that do not align with the new mission of the Biology subject listing.

The mission of the Integrated Science subject listing will be to improve science education for all students through the development, testing and offering of innovative courses that serve science students across campus, particularly in their beyond the classroom learning experiences, and through offering teaching and learning professional development courses for science educators at all levels (K-20). The existing and potential future courses in the proposed subject listing represent a coherent program of study in the practice, innovation and scholarship of science teaching and learning. Though the courses in the Integrated Science subject listing will serve science students across schools and colleges, the mission of the listing aligns most closely with the School of Education's (SoE) mission to "advance public education for learners at all levels in a variety of settings." Therefore, we propose that the Integrated Science subject listing become part of the School of Education's timetable.

Once the Integrated Science subject listing is established, course change proposals will be submitted for the permanent WISCIENCE courses and new course proposals for the independent study, internship and special topics courses that are currently in the Biology subject listing (see the appendix for a list of courses). Integrated Science courses will be not part of the School of Education's science teacher certification program, but rather practitioner-based professional development courses for graduate science students and in-service K-12 science teachers.



Faculty Governance

We propose a faculty governance structure that is aligned with campus subject listing policies. The WISCIENCE faculty director will appoint faculty members to serve on the WISCIENCE curriculum committee. These faculty members will be from science and education departments from across campus, have expertise in science teaching and learning, and they will be able to identify and advise the committee regarding potential overlap with existing programs or courses when new course proposals are submitted. All new course and course change proposals will be reviewed and approved by this committee. Once approved, proposals will advance to the School of Education's Programs Committee, and then the University Curriculum Committee for approval. The following faculty members have agreed to serve on the WISCIENCE curriculum committee:

- Professor Gary Diffie, Department of Kinesiology, School of Education
- Professor Jeffrey Hardin, Department of Zoology, College of Letters and Sciences
- Professor Katherine McMahon, Departments of Bacteriology and Civil and Environmental Engineering, Colleges of Agricultural and Life Sciences and Engineering
- Professor John Rudolph, Department of Curriculum and Instruction, School of Education
- Professor Peter Timbie, Department of Physics, College of Letters and Sciences

Course Instructors

Faculty and instructional staff members in WISCIENCE and from across campus will continue to be the developers and instructors of record of WISCIENCE courses in the Integrated Science subject listing. This subject listing will provide a catalytic space where faculty and instructional staff from across campus can collaborate with education experts at the Institute to develop innovative science courses designed to serve students across campus and as models for adoption by UW-Madison departments and other institutions. For example, faculty and instructional staff members from the departments of Genetics (CALs), Cell and Regenerative Biology (SMPH), Oncology (SMPH) and Comparative Biosciences (Vet Med) have been instructors of record for the Entering Research courses (Biology 260 & 261), which serve students from many different biological sciences majors. These courses have also been adopted by the Chemistry department (Chemistry 260 & 261) and by other institutions across the nation. Likewise, the Institute's Engage Children in Science service learning course (Biology 375) has been adapted and implemented in the Computer Science department, and many of the science teacher professional development courses (Biology 675) serve the School of



Education's Wisconsin Leads program for in-service K-12 science teachers. When appropriate and at the request of a faculty instructor, Integrated Science courses may be cross-listed.

Beyond providing a space for faculty and instructional staff to develop innovative courses for campus, the Integrated Science subject listing will also be a common access point for teaching and learning courses offered by other units on campus. For example, graduate student professional development courses associated with the Delta Program in Research, Teaching and Learning and science teacher professional development courses associated with the Education Outreach and Partnerships (EOP) Office in the School of Education may be cross-listed in Integrated Science.

Students Served

Courses in the Integrated Science subject listing will serve undergraduate, graduate and non-traditional students. Since WISCIENCE does not offer an academic degree program, the way in which Integrated Science courses will support and advance student progress toward degree will vary depending on the individual student's degree program and goals. For example, undergraduate students whose degree programs require them to do independent research or community service would be supported through the Entering Research courses and the Engage Children in Science course, respectively. Graduate students, who are interested in complementing their research training with teaching professional development courses, or earning a Delta certificate, would be supported by the Scientific Teaching and Instructional Materials Design courses. Similarly, the Science Topics for Teachers courses would serve in-service K-12 science teachers, who must earn continuing education credits. If a degree program should decide to require an Integrated Science course, then WISCIENCE will work with that program to secure the resources needed to meet increased enrollment demands.

Resource Foundation

The WISCIENCE Administrative Director (currently being recruited, PVL#84092) and Student Services Coordinator, Aaron Miller, will be responsible for the administration of the Integrated Science subject listing. The Administrative Director will work closely with the WISCIENCE faculty director and curriculum committee to coordinate with the School of Education Dean's Office. She or he will provide general oversight of the subject listing and be responsible for shepherding course change and new course proposals through the university course proposal system. Aaron Miller, who reports to the Administrative Director, will be responsible for updating course listings and managing enrollment each semester.



Catalyzing Innovation and UW-Madison's Leadership in Advancing Science Education

Importantly, the development of WISCIENCE courses is frequently funded by extramural grants awarded to Institute staff members in collaboration with faculty and staff members from across campus. These awards have come from external agencies such as the National Science Foundation and the Howard Hughes Medical Institute, and from internal sources such as the Ira and Ineva Reilly Baldwin Wisconsin Idea Endowment and the Educational Innovation program. Having a subject listing to develop and pilot test new science courses has and will continue to support the university's leadership in advancing science education at all levels and to play a key role in our success in securing extramural funding to support these efforts.



APPENDIX

WISCIENCE courses currently listed in Biology that will transfer via course change proposal or new course proposal to Integrated Science

	Title	X-Listing	Audience	Brief Description
100	Exploring Biology - FIG	--	first year undergrad	2-credit first-year course on core concepts in biology (evolution; transformation of energy and matter; information exchange and storage; structure and function; systems biology), professions in biology, and development of the skills and knowledge needed for a successful academic career in the biological sciences.
150	Ways of Knowing Biology	--	first year undergrad	1-credit first-year course introduction to biological sciences research at UW-Madison. Students hear research presentations from biological sciences faculty, shadow a graduate student and visit three research groups.
260	Entering Research Part 1	--	sophomore & junior	1-credit seminar course for sophomore or transfer students starting independent research in science. Taken concurrently with 1-3 independent research credits with faculty member.
261	Entering Research Part 2	--	sophomore & junior	1-credit seminar course for sophomore or transfer students continuing independent research in science. Taken concurrently with 1-3 independent research credits with faculty member.
299	Directed Studies	--	freshman & sophomore	Beginning independent study with a mentor (variable credit)
375	Special Topics	--	undergrad	New courses and courses offered for a single semester at the undergraduate level. (variable credit)
399	Internship/Field Experience	--	undergrad	Work or teaching experience under the supervision of a mentor (variable credit)
660	Research Mentor Training	--	grad	1-credit practicum course for graduate, post-doctoral or senior undergraduate students taken concurrently while mentoring an undergraduate student researcher.
675	Special Topics	--	grad	New courses and courses offered for a single semester at the graduate level. (variable credit)
699	Directed Studies	--	junior & senior	Advanced independent study with a mentor (variable credit)
800	Inquiry Based Biology Teaching	Plant Pathology	grad	Wisconsin Program for Scientific Teaching (WPST) ,1 credit course covering the fundamentals of learning theory and practical strategies for teaching biology. Students practice lecturing, manage classroom dynamics, and teach.
801	Instructional Materials Design	Plant Pathology	Grad	Wisconsin Program for Scientific Teaching (WPST) , 1 credit course in which students develop instructional materials and implement them in an undergraduate course (e.g. Bio 100)

Notes:

- The "Special Topics" courses currently taught through WISCIENCE will be proposed as permanent courses once the Integrated Science subject listing is established. These include Biology 375 courses (Engage Children



in Science, Exploring Service in Science, Exploring Discipline Leadership and Mentoring, Secrets of Science) and Biology 675 courses (Science Topics for Teachers).

- The Wisconsin Program for Scientific Teaching (WPST) program courses were originally developed by former Plant Pathology Professor Jo Handelsman. Responsibility for the WPST was transferred to WISCIENCE when Professor Handelsman left campus. A course change proposal to transfer the WPST courses to Integrated Science will be submitted once the listing is established and pending approval from the Plant Pathology department.

