

# INTEGRATIVE BIOLOGY, MS

The Integrative Biology Graduate Program provides training in the following broad subject areas: cellular and molecular biology, developmental biology, neuroscience, physiology, ecology, evolution, and animal behavior. There is great flexibility in our graduate program to serve the diverse scholarly interests and cultures in the Department of Integrative Biology. Each student's course of study is tailored to his or her individual interests, career goals, and needs, and we admit students with diverse academic backgrounds. The path taken by a student results from a deliberative process that involves discussions between the student and the student's advisor and advisory committee.

The Department of Integrative Biology faculty strongly believes that graduate education should be distinguished from undergraduate education in recognition of individuality and emphasis on responsibility in graduate students. This philosophy requires flexibility and is not well served by the imposition of many formal requirements to be met by all students. Rather, more emphasis is placed on the role of advisory committees in devising programs of breadth and depth appropriate for individual students with due regard to areas outside of biology that are important for the student's effectiveness in their chosen field.

The faculty, students, and staff in the Integrative Biology Graduate Program are committed to supporting a diverse, equitable, and inclusive workplace. We believe that each person's identity, background, ethnicity, race, sexual orientation, beliefs, and other experiences fuel the creativity and innovation that are central to scientific discovery.

## FACILITIES

Facilities and staff are available for advanced study in a wide variety of biological fields, including aquatic and terrestrial ecology, conservation biology, cell/molecular/developmental and neurobiology, endocrinology, ethology, genetics, evolution and systematics, comparative physiology, and physiological ecology.

In addition to a broad range of well-equipped laboratories, research facilities include advanced microscopy facilities (<http://www.microscopy.wisc.edu/>), limnological laboratories on campus (Lake Mendota) and in northern Wisconsin (Trout Lake), the University Arboretum, the Zoological Museum, and a Molecular Systematics Laboratory.

## ADMISSIONS

### ADMISSIONS

Please consult the table below for key information about this degree program's admissions requirements. The program may have more detailed admissions requirements, which can be found below the table or on the program's website.

Graduate admissions is a two-step process between academic programs and the Graduate School. **Applicants must meet the minimum requirements (<https://grad.wisc.edu/apply/requirements/>) of the Graduate School as well as the program(s).** Once you have researched

the graduate program(s) you are interested in, apply online (<https://grad.wisc.edu/apply/>).

Requirements	Detail
Fall Deadline	December 1
Spring Deadline	September 1
Summer Deadline	The program does not admit in the summer.
GRE (Graduate Record Examinations)	Not required.
English Proficiency Test	Refer to the Graduate School: Minimum Requirements for Admission policy: <a href="https://policy.wisc.edu/library/UW-1241">https://policy.wisc.edu/library/UW-1241</a> ( <a href="https://policy.wisc.edu/library/UW-1241/">https://policy.wisc.edu/library/UW-1241/</a> ).
Other Test(s) (e.g., GMAT, MCAT)	n/a
Letters of Recommendation Required	3

Given the broad nature of the program, there are no strict prerequisites for admission. Interested applicants should identify and contact potential faculty advisors. Admission to the graduate program is contingent upon being accepted by an individual faculty advisor. Applicants should contact potential faculty advisors by email early in the application process to discuss mutual interests and to determine if the faculty member is actively recruiting graduate students. For a list of all faculty members and their research interests, please see People (<https://integrativebiology.wisc.edu/people/>) on the department website.

In addition to the Graduate School application, all applicants must electronically submit at least three letters of recommendation, the supplemental questions, a personal statement including areas of research interest and the names of prospective faculty advisors, a CV/resume, and unofficial transcripts from all undergraduate and graduate schools attended (official transcripts will be requested if recommended for admission to the program). For more specific instructions regarding application requirements, please see Prospective Students (<https://integrativebiology.wisc.edu/prospective-graduate-students/>) on the department website. Most admission decisions will be made, and applicants will be notified, by the end of March.

## FUNDING

### FUNDING GRADUATE SCHOOL RESOURCES

The Bursar's Office provides information about tuition and fees associated with being a graduate student. Resources to help you afford graduate study might include assistantships, fellowships, traineeships, and financial aid. Further funding information is available from the Graduate School. Be sure to check with your program for individual policies and restrictions related to funding.

### PROGRAM RESOURCES

Application fee waivers are available to qualified students through the graduate school and can often be made available by the professors in the department. Financial support is available to qualified graduate

students in the form of teaching assistantships, research assistantships, and fellowships.

Graduate students who have a teaching or research assistantship of at least a 33% appointment during the fall or spring semester are eligible to receive remission of full tuition. Fellowships that are payrolled through the university and that carry stipends equivalent to at least a 33% research assistantship also qualify for remission of non-resident tuition. Tuition remission is conditionally awarded at the start of the semester based on the expectation that actual earnings during the semester will be at least 33% of the full-time rate.

All students pay segregated fees. The only exception is that fellowships paid through the Graduate School have segregated fees waived in addition to tuition. Segregated fees are used for campus overhead to help pay for the exercise facilities, student unions, student organization funding, etc.

Assistantships and fellowships also provide eligibility for an excellent health insurance program, an extremely valuable benefit that provides single or family coverage that is more comprehensive than individuals can usually purchase on their own. Additionally, assistantships and fellowships provide a stipend for living expenses.

### Teaching Assistantships

The most common source of support is a teaching assistantship. To receive a teaching assistantship, candidates for admission must meet the following requirements:

- evidence (usually from the undergraduate transcript) of an appropriate background in the relevant subject matter of the course(s) to which appointment is being considered;
- evidence (usually from letters of recommendation or verbal communication) of the candidate's potential as a teaching assistant;
- an undergraduate GPA of 3.0 or above (on a 4.0 scale); and
- for students whose native language is not English, evidence of competence in spoken English through the SPEAK test that is administered by UW–Madison. International applicants should note that a TA appointment is not normally possible during the first year of graduate study.

Current students who apply for their first teaching assistantship are also subject to the above criteria, as well as their performance as a graduate student. Reappointment as a teaching assistant depends upon satisfactory progress as a graduate student, satisfactory performance as a teaching assistant, and completing the Equity/Diversity TA Training.

Teaching assistants may be eligible for UW–Madison teaching awards (<https://grad.wisc.edu/taawards/>), including the Early Excellence in Teaching Award, Exceptional Service Award, Innovation in Teaching Award, Capstone PhD Teaching Award, and the College of Letters & Science Teaching Fellow Award.

### Research Assistantships

Research assistantships are made possible by grants awarded to faculty for particular research programs. Recipients are selected by the individual professor concerned, and the student's interests and experience must match the needs of the funding project. Availability of research assistantships varies.

### Advanced Opportunity Fellowships

Advanced Opportunity Fellowships (AOF) are granted to the UW–Madison Graduate School by the State of Wisconsin and are combined with other graduate education funds to support the recruitment and retention of

highly qualified students in UW–Madison graduate programs. Fellowships are competitive and merit-based. AOF fellowships are paid through the Graduate School by the College of Letters & Science's Community of Graduate Research Scholars (<http://ls.wisc.edu/current-students/graduate-students/cgrs/>) (CGRS) program.

### External Fellowships

Fellowships from professional societies and outside agencies provide another important source of aid for which students may apply either before or after commencing graduate work at UW–Madison. If necessary, external fellowships can often be supplemented with university funds up to prevailing university fellowship rates.

All qualified students who are U.S. citizens or permanent residents are urged to apply to the National Science Foundation (NSF) Graduate Research Fellowship Program (GRFP). Students apply directly to NSF; the closing date is usually in early November. Please check the NSF (<http://www.nsf.gov/>) website for the application instructions and deadline.

## REQUIREMENTS

### MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum degree requirements (<https://guide.wisc.edu/graduate/#requirements>) and policies (<https://guide.wisc.edu/graduate/#policies>), in addition to the program requirements listed below.

### MAJOR REQUIREMENTS MODE OF INSTRUCTION

Face to Face	Evening/ Weekend	Online	Hybrid	Accelerated
Yes	No	No	No	No

#### Mode of Instruction Definitions

**Accelerated:** Accelerated programs are offered at a fast pace that condenses the time to completion. Students typically take enough credits aimed at completing the program in a year or two.

**Evening/Weekend:** Courses meet on the UW–Madison campus only in evenings and/or on weekends to accommodate typical business schedules. Students have the advantages of face-to-face courses with the flexibility to keep work and other life commitments.

**Face-to-Face:** Courses typically meet during weekdays on the UW–Madison Campus.

**Hybrid:** These programs combine face-to-face and online learning formats. Contact the program for more specific information.

**Online:** These programs are offered 100% online. Some programs may require an on-campus orientation or residency experience, but the courses will be facilitated in an online format.

### CURRICULAR REQUIREMENTS

#### Requirement Detail

Minimum Credit Requirement 30 credits

Minimum Residence Credit Requirement	16 credits
Minimum Graduate Coursework Requirement	15 credits must be graduate-level coursework. Refer to the Graduate School: Minimum Graduate Coursework (50%) Requirement policy: <a href="https://policy.wisc.edu/library/UW-1244">https://policy.wisc.edu/library/UW-1244</a> ( <a href="https://policy.wisc.edu/library/UW-1244/">https://policy.wisc.edu/library/UW-1244/</a> ).
Overall Graduate GPA Requirement	3.00 GPA required. Refer to the Graduate School: Grade Point Average (GPA) Requirement policy: <a href="https://policy.wisc.edu/library/UW-1203">https://policy.wisc.edu/library/UW-1203</a> ( <a href="https://policy.wisc.edu/library/UW-1203/">https://policy.wisc.edu/library/UW-1203/</a> ).
Other Grade Requirements	An average record of B or better in all work taken as a graduate student is required by the Department of Integrative Biology (grades of P and S are for this purpose considered to be satisfactory at the B level; grades of Incomplete are considered for this purpose to be unsatisfactory if they are not removed during the following semester of residence).
Assessments and Examinations	In the second semester of the first year, students must complete the Certification of Candidate for a Master's Degree.  Typically the defense of the master's degree occurs no later than the end of the student's sixth semester. A master's degree warrant must be requested from the department prior to the defense.
Language Requirements	To be determined by the advisory committee.

## REQUIRED COURSES

MS students in Integrative Biology must take courses and seminars to fulfill the minimum credit requirement for the degree. Specific courses (examples are listed below) are approved by the student's advisor or advisory committee and depend on the student's research area, interests, and goals.

Code	Title	Credits
<b>Graduate Level Coursework</b>		
At least 50% of credits must be with courses designated as graduate level coursework ("Grad 50%" attribute). Examples listed below.		15
<b>Research Credits</b>		
Complete research credits.		6-9
ZOOLOGY 799	Independent Study	
ZOOLOGY 990	Research	
<b>Additional Electives</b>		
Complete additional electives consulted by student's advisor		6
<b>Total Credits</b>		<b>30</b>

## Common Graduate Level Courses

Code	Title	Credits
ANTHRO 458	Primate Behavioral Ecology	3
B M I/COMP SCI 776	Advanced Bioinformatics	3
B M I/STAT 877	Statistical Methods for Molecular Biology	3

BOTANY/ENTOM/ PL PATH 505	Plant-Microbe Interactions: Molecular and Ecological Aspects	3
BOTANY/ PL PATH 563	Phylogenetic Analysis of Molecular Data	3
BOTANY 801	Advanced Plant Community Ecology	4
BOTANY 802	Physiological Plant Ecology	3
BOTANY 860	Plant Cell Biology	2
CRB 640	Fundamentals of Stem Cell and Regenerative Biology	3
CRB 650	Molecular and Cellular Organogenesis	3
ENTOM 321	Physiology of Insects	3
ENTOM/ ZOOLOGY 371	Medical Entomology: Biology of Vector and Vector-borne Diseases	3-4
ENTOM/ F&W ECOL 711	Multivariate Analysis of Ecological and Community Data	2
ENTOM 901	Seminar in Organismal Entomology	1
F&W ECOL/STAT 571	Statistical Methods for Bioscience I	4
F&W ECOL/ STAT 572	Statistical Methods for Bioscience II	4
GENETICS/ BIOCHEM/ MICROBIO 612	Prokaryotic Molecular Biology	3
GENETICS/ BIOCHEM/ MD GENET 620	Eukaryotic Molecular Biology	3
GENETICS/ENTOM/ ZOOLOGY 624	Molecular Ecology	3
GENETICS/ CHEM 626	Genomic Science	2
GENETICS/ BIOCHEM 631	Plant Genetics and Development	3
GENETICS 633	Population Genetics	3
GENETICS/CRB 710	Developmental Genetics	3
GENETICS 885	Advanced Genomic and Proteomic Analysis	3
NEURODPT 629	Molecular and Cellular Mechanisms of Memory	3
NTP/ NEURODPT 610	Cellular and Molecular Neuroscience	4
NTP/NEURODPT/ PSYCH 611	Systems Neuroscience	4
NTP/ NEURODPT 640	Computational Neuroscience: From Single Cells to Whole Brain Models	3
NTP 677	Basic Sleep Mechanisms and Sleep Disorders: from Neurobiology to Sleep Medicine	3
NTP 701	Experimental Design and Statistical Methodology	1
PATH 750	Cellular and Molecular Biology/ Pathology	2
PATH 752	Cellular and Molecular Biology/ Pathology Seminar	1
PATH 755	Responsible Conduct in Research: Research Ethics, Rigor, Reproducibility and Transparency	2

ZOOLOGY/ BOTANY/ ENTOM 473	Plant-Insect Interactions	3	ZOOLOGY 960	Seminar in Cellular Biology	1
ZOOLOGY/ BOTANY/ENVIR ST/ F&W ECOL 516	Conservation Biology	3	ZOOLOGY 962	Seminar-Ethology	1
ZOOLOGY/AN SCI/ F&W ECOL 520	Ornithology	3	ZOOLOGY/ ATM OCN/ BOTANY/ENVIR ST/ F&W ECOL/GEOG/ GEOSCI 980	Earth System Science Seminar	1
ZOOLOGY/AN SCI/ F&W ECOL 521	Birds of Southern Wisconsin	3	ZOOLOGY 990	Research	1-9
ZOOLOGY/ ENTOM 540	Theoretical Ecology	3	<b>POLICIES</b>		
ZOOLOGY/ GEOSCI 542	Invertebrate Paleontology	3	<b>GRADUATE SCHOOL POLICIES</b>		
ZOOLOGY 603	Endocrinology	3-4	The Graduate School's Academic Policies and Procedures ( <a href="https://grad.wisc.edu/acadpolicy/">https://grad.wisc.edu/acadpolicy/</a> ) serve as the official document of record for Graduate School academic and administrative policies and procedures and are updated continuously. Note some policies redirect to entries in the official UW-Madison Policy Library ( <a href="https://policy.wisc.edu/">https://policy.wisc.edu/</a> ). Programs may set more stringent policies than the Graduate School. Policies set by the academic degree program can be found below.		
ZOOLOGY 604	Computer-based Gene and Disease/Disorder Research Lab	2	<b>MAJOR-SPECIFIC POLICIES</b>		
ZOOLOGY 620	Neuroethology Seminar	2	<b>PRIOR COURSEWORK</b>		
ZOOLOGY/ F&W ECOL 660	Climate Change Ecology	3	<b>Graduate Credits Earned at Other Institutions</b>		
ZOOLOGY/ BOTANY/ F&W ECOL 672	Historical Ecology	2	With program approval, students may be allowed to transfer up to 14 credits of graduate coursework from other institutions. Coursework earned ten or more years prior to admission to a master's degree is not allowed to satisfy requirements.		
ZOOLOGY/ NEURODPT/ PSYCH 674	Behavioral Neuroendocrinology Seminar	2	<b>Undergraduate Credits Earned at Other Institutions or UW-Madison</b>		
ZOOLOGY/ BOTANY 725	Ecosystem Concepts	3	No undergraduate coursework is allowed to transfer.		
ZOOLOGY/ ATM OCN/ ENVIR ST/ GEOSCI 750	Problems in Oceanography	3	<b>Credits Earned as a Professional Student at UW-Madison (Law, Medicine, Pharmacy, and Veterinary careers)</b>		
ZOOLOGY/ NEURODPT 765	Developmental Neuroscience	3	Refer to the Graduate School: Transfer Credits for Prior Coursework ( <a href="https://policy.wisc.edu/library/UW-1216/">https://policy.wisc.edu/library/UW-1216/</a> ) policy.		
ZOOLOGY 799	Independent Study	1-6	<b>Credits Earned as a University Special Student at UW-Madison</b>		
ZOOLOGY 800	Advanced Topics in the Biological Sciences	1-3	With program approval, students may be allowed to transfer 15 credits taken as a UW-Madison University Special student. Coursework earned ten or more years prior to admission to a master's degree is not allowed to satisfy requirements.		
ZOOLOGY/ BOTANY/ENTOM/ GENETICS 820	Foundations of Evolution	2	<b>PROBATION</b>		
ZOOLOGY/ BOTANY/ENTOM/ F&W ECOL 821	Foundations of Ecology	2	Refer to the Graduate School: Probation ( <a href="https://policy.wisc.edu/library/UW-1217/">https://policy.wisc.edu/library/UW-1217/</a> ) policy.		
ZOOLOGY/ BOTANY/ F&W ECOL 879	Advanced Landscape Ecology	3	<b>ADVISOR / COMMITTEE</b>		
ZOOLOGY/ AGROECOL/ ATM OCN/BOTANY/ ENTOM/ENVIR ST/ F&W ECOL/ GEOG 953	Introduction to Ecology Research at UW-Madison	1-2	Every graduate student is required to have an advisor and a committee. To ensure that students are making satisfactory progress toward a degree, every student is required to meet with the advisor and committee annually to review progress. If a progress report has not been filed by April 1, a hold will be placed on student course registration.		
ZOOLOGY/AN SCI/ OBS&GYN 954	Seminar in Endocrinology-Reproductive Physiology	0-1	<b>CREDITS PER TERM ALLOWED</b>		
ZOOLOGY 955	Seminar-Limnology	1	15 credit maximum. Refer to the Graduate School: Maximum Credit Loads and Overload Requests ( <a href="https://policy.wisc.edu/library/UW-1228/">https://policy.wisc.edu/library/UW-1228/</a> ) policy.		
ZOOLOGY 956	Seminar-Ecology	1			
ZOOLOGY 957	Seminar-Evolution	1			

## TIME LIMITS

It is expected that a master's student will complete the thesis or research report by the end of the third academic year. If this is not accomplished by the end of the summer following the third academic year, the major professor must present a written statement to the Director of Graduate Studies that explains why the master's degree has not been completed and describes plans that the student and the student's advisory committee have agreed upon to ensure completion, including specific expectations, dates for completion, and consequences should expectations not be met. Continuation in the program beyond four years will be at the discretion of the mentor and advisory committee. Five years is the outside limit by which a student must complete the master's degree.

It is up to the student's committee to determine whether or not a student who has been absent for five or more consecutive years can use that coursework to count toward satisfying degree requirements.

## GRIEVANCES AND APPEALS

These resources may be helpful in addressing your concerns:

- Bias or Hate Reporting (<https://doso.students.wisc.edu/bias-or-hate-reporting/>)
- Graduate Assistantship Policies and Procedures (<https://hr.wisc.edu/policies/gapp/#grievance-procedure>)
- Hostile and Intimidating Behavior Policies and Procedures (<https://hr.wisc.edu/hib/>)
  - Office of the Provost for Faculty and Staff Affairs (<https://facstaff.provost.wisc.edu/>)
- Employee Assistance (<http://www.eao.wisc.edu/>) (for personal counseling and workplace consultation around communication and conflict involving graduate assistants and other employees, post-doctoral students, faculty and staff)
- Employee Disability Resource Office (<https://employeedisabilities.wisc.edu/>) (for qualified employees or applicants with disabilities to have equal employment opportunities)
- Graduate School (<https://grad.wisc.edu/>) (for informal advice at any level of review and for official appeals of program/departmental or school/college grievance decisions)
- Office of Compliance (<https://compliance.wisc.edu/>) (for class harassment and discrimination, including sexual harassment and sexual violence)
- Office Student Assistance and Support (OSAS) (<https://osas.wisc.edu/>) (for all students to seek grievance assistance and support)
- Office of Student Conduct and Community Standards (<https://conduct.students.wisc.edu/>) (for conflicts involving students)
- Ombuds Office for Faculty and Staff (<http://www.ombuds.wisc.edu/>) (for employed graduate students and post-docs, as well as faculty and staff)
- Title IX (<https://compliance.wisc.edu/titleix/>) (for concerns about discrimination)

## L&S POLICY FOR GRADUATE STUDENT ACADEMIC APPEALS

Graduate students have the right to appeal an academic decision related to an L&S graduate program if the student believes that the decision is inconsistent with published policy.

Academic decisions that may be appealed include:

- Dismissal from the graduate program
- Failure to pass a qualifying or preliminary examination
- Failure to achieve satisfactory academic progress
- Academic disciplinary action related to failure to meet professional conduct standards

Issues such as the following cannot be appealed using this process:

- A faculty member declining to serve as a graduate student's advisor.
- Decisions regarding the student's disciplinary knowledge, evaluation of the quality of work, or similar judgements. These are the domain of the department faculty.
- Course grades. These can be appealed instead using the L&S Policy for Grade Appeal (<https://kb.wisc.edu/lis/22258/>).
- Incidents of bias or hate, hostile and intimidating behavior (<https://hr.wisc.edu/hib/>), or discrimination (Title IX (<https://compliance.wisc.edu/titleix/>), Office of Compliance (<https://compliance.wisc.edu/eo-complaint/formal-investigations/>)). Direct these to the linked campus offices appropriate for the incident(s).

## Appeal Process for Graduate Students

A graduate student wishing to appeal an academic decision must follow the process in the order listed below. Note time limits within each step.

1. The student should first seek informal resolution, if possible, by discussing the concern with their academic advisor, the department's Director of Graduate Studies, and/or the department chair.
2. If the program has an appeal policy listed in their graduate program handbook, the student should follow the policy as written, including adhering to any indicated deadlines. In the absence of a specific departmental process, the chair or designee will be the reviewer and decision maker, and the student should submit a written appeal to the chair within 15 business days of the academic decision. The chair or designee will notify the student in writing of their decision.
3. If the departmental process upholds the original decision, the graduate student may next initiate an appeal to L&S. To do so, the student must submit a written appeal to the L&S Assistant Dean for Graduate Student Academic Affairs within 15 business days of notification of the department's decision.
  - a. To the fullest extent possible, the written appeal should include, in a single document: a clear and concise statement of the academic decision being appealed, any relevant background on what led to the decision, the specific policies involved, the relief sought, any relevant documentation related to the departmental appeal, and the names and titles of any individuals contributing to or involved in the decision.
  - b. The Assistant Dean will work with the Academic Associate Dean of the appropriate division to consider the appeal. They may seek additional information and/or meetings related to the case.
  - c. The Assistant Dean and Academic Associate Dean will provide a written decision within 20 business days.
4. If L&S upholds the original decision, the graduate student may appeal to the Graduate School. More information can be found on their website: Grievances and Appeals (<https://grad.wisc.edu/documents/grievances-and-appeals/>) (see: Graduate School Appeal Process).

## OTHER

There is great flexibility in our graduate program to serve the diverse scholarly interests and cultures in the Department of Integrative Biology. The path taken by a student results from a deliberative process that involves discussions between the student and the student's advisor and

advisory committee. The department's policy is to only accept students that can be financially supported by teaching assistantships, research assistantships, and/or fellowships.

## PROFESSIONAL DEVELOPMENT

### PROFESSIONAL DEVELOPMENT GRADUATE SCHOOL RESOURCES

Take advantage of the Graduate School's professional development resources (<https://grad.wisc.edu/pd/>) to build skills, thrive academically, and launch your career.

### DEPARTMENT RESOURCES

A goal for our graduate program is to provide students in Integrative Biology with diverse training that will prepare them for a range of flexible and sustainable careers (e.g., academia, industry, government, science policy and administration, science commerce, science writing, law, and science education and outreach at all levels). In consultation with their advisor and advisory committee, students can engage in professional development, teaching training (e.g., through the Delta program), internships in industry, science writing, and/or policy, and some earn master's degrees in areas that complement their studies in Integrative Biology (e.g., biostatistics, biotechnology).

## LEARNING OUTCOMES

### LEARNING OUTCOMES

1. Knowledge: Master fundamental skills in at least one of the broad subject areas represented in the Department of Integrative Biology.
2. Research: Students will complete an original research project in one of the broad subject areas represented in the Department of Integrative Biology.
3. Communication: Effectively communicate in writing and orally.
4. Ethical Conduct: Students will have an understanding of professional and ethical responsibility.
5. Career Preparation: Students will be provided with diverse training that will prepare them for a range of flexible and sustainable careers (e.g., academia, industry, government, science policy and administration, science commerce, science writing, law, and science education and outreach at all levels).