



## **Guidelines for the Evaluation of Two-Year Undergraduate Biology**

### **Evaluation Criteria: Faculty and Professional Development**

#### *Recommendations for Faculty Size and Composition*

Full-time biology faculty members should all have at least a Masters degree in a biological discipline. The faculty within the biology (or science) department should be diverse enough to provide a well-rounded approach to the discipline. This diversity includes: diversity in areas of domains, diversity in laboratory and field study research, diversity in types of graduate training and professional preparation, and diversity in sub-disciplines. Among the faculty, there should be expertise in the organismal domain, in the ecological domain, in the cellular and molecular domain, and in field studies.

#### *Recommendations for Teaching Load*

Faculty should teach a maximum of the equivalent of 12 semester hours per term, with not more than 15 contact hours. The ratio of students to faculty member for non-laboratory biology courses should be no greater than 30:1; for laboratory courses, the ratio should be no greater than 24:1. Faculty members directing independent student studies or research, or performing administrative duties, should have their teaching load adjusted or be provided with compensation.

#### *Recommendations for Professional Development*

All faculty members should be engaged in professional development. This scholarship can be in either a biological discipline or pedagogical research. The department should have a balance between the two. Evidence of faculty scholarship includes, but is not limited to, presentations at regional and national conferences, publications of books and refereed articles, participation in professional development workshops, and procurement of external and internal grants.

All faculty members involved in the biology program should maintain currency in their field. Funds should be provided for each faculty member to attend a minimum of one professional meeting each year.

## **Evaluation Criteria: Curriculum**

### *General Recommendations*

The following criteria describe a high-quality program in biology. The goal of these recommendations is to provide undergraduate students with the knowledge and skills necessary to enter a career or bachelor's program in the biological sciences. While each department offering a certificate program, biology courses, or associates degree in biology should develop a curriculum that meets the needs of its students and institution, it should consider including as many aspects of these recommendations as possible.

### *Curriculum Requirements*

This laboratory component should account for at least one-quarter of the course and include hands-on experimentation. Computer simulations should not replace the laboratory experience.

The curriculum should be designed so that students develop skills in writing scientific papers, performing statistical analysis of data, reading primary literature, and designing and completing valid scientific experiments. The curriculum should be developed so that the nature of science is stressed and the investigative nature of science is infused throughout the curriculum.

Group and individual research projects should be incorporated into all courses. The curriculum should be structured so that more extensive independent work and data analysis is required as the student progresses from introductory to upper-level courses. These projects should be developed so that students are exposed to library research, field-based research, and laboratory-based research.

Evolution as the unifying theory of biology should be specifically addressed within the curriculum and should be infused throughout the curriculum.

All aspects of the curriculum should adhere to state and federal safety guidelines.

## **Evaluation Criteria: Support Staff**

### *General Recommendations*

All full- and part-time staff should undergo safety training before beginning employment. This training should include the proper use of safety equipment, and the proper handling, storage, and disposal of chemical, biological, and microbiological materials.

### *Recommendations for Support Staff*

It is not in the interest of the students or institution for faculty to spend significant amounts of time performing clerical tasks or preparing materials for teaching laboratories. For this reason, high-quality programs in biology should have the following:

1. All instructional faculty should be provided assistance by a full-time (or FTE) laboratory coordinator. The minimum recommendation for a department of four full-time faculty is one full-time (or FTE) laboratory coordinator. This staff person should supply assistance in the preparation and maintenance of materials and supplies for instructional laboratories. The person holding this position should have at least a bachelor's degree in a biological or chemical discipline. Biology departments offering more than eight laboratory sessions per week should supplement their laboratory coordinator with part-time employees. These may be students. These individuals should work under the direction of full-time faculty or the laboratory coordinator.
2. All faculty should have adequate access to a staff person who provides assistance with course handouts, departmental affairs, and accounting.

### **Evaluation Criteria: Technology**

#### *General Recommendations*

Faculty and students should have easy access to Internet-enabled computers that can functionally run all of the software and various computer peripherals necessary for creating or viewing documents, multimedia presentations, and communication needed for the courses and program. This includes peripherals such as flat-bed scanners, digital cameras, digital projectors, and scanners. All computers for faculty and student use should have the appropriate network connections, hardware, and software for viewing documents or multimedia presentations (which may include DVD/BluRay), and communicating via the Internet.

This includes:

Hardware—adequate RAM, adequate sound and video cards, hard?drive space, CD drives, and CPU

Software—programs for word processing, creating spreadsheets and graphs, creating presentations, image processing, and Web page construction. The institution should provide financial and technical support to regularly maintain and improve the computer technology available on campus.

#### *Recommendations for Faculty*

All full-time faculty should have computers in their offices. These computers should be replaced or upgraded every three years or less. The Biology Department should have scanners available for easy use by the faculty. Faculty who make regular use of scanners should have one in their

office. Instructors should have ready access to some method of showing multimedia presentations. This should include a digital projector or some other form of projecting digital images, a screen, and a computer. There should be a minimum of one multimedia classroom or movable projection system (projector and laptop) for every three faculty members. Faculty should have access to a computer classroom with sufficient numbers of computers so that there is at minimum one for every two students.

Training sessions on how to use the various computer technologies available and follow-up support should be provided to faculty.

### *Recommendations for Students*

Students graduating with an associates degree in biology should be computer literate. They should be able to demonstrate an understanding of basic computer operations, be able to utilize computer technology for the exchange of information, and use computers to collect and analyze data, and produce publications.

Students should have computer access in each biology lab for data collection and analysis. There should be a minimum of one computer for every 4 students. Students should have out-of-class access to a computer lab facility. The computer facility should be open a minimum of 16 hours a day/5 days a week and should provide technical support personnel for at least 10 of those hours. Training sessions on how to use the various computer technologies available should be provided to students.

## **Evaluation Criteria: Laboratory Instrumentation**

### *General Recommendations*

There are at least two purposes for equipment within a biology program: 1) to prepare materials for instructional use or for research, and 2) to provide opportunities to gain skills in the operation and application of equipment.

1. Recommendations for the minimum equipment available for the preparation of instructional materials and/or for faculty/student research. Faculty should have easy access to the following:

- minimum of two incubators/growth chambers
- deionized/distilled water system
- minimum of three refrigerators/freezers, including at least one 20° or 80° C freezer
- minimum of two water baths
- glassware washer
- autoclave
- aquarium
- greenhouse or plant growth area
- microwave
- microscope with camera
- stereo microscope with camera

- phase microscope
- fume hood

2. Recommendations for equipment that students should be able to use properly upon graduation. Description of how this equipment is used in the biology curriculum is acceptable as evidence of student acquisition of these skills.

- light microscopes
- stereo microscopes
- micro-centrifuge
- low speed centrifuge/tabletop centrifuge
- hot plates and stirrers
- electrophoresis apparatus
- PCR thermocycler
- micropipettes and standard pipetting devices
- pH meters
- analytical balances/pan balances
- dissection tools
- basic water and soil analysis test kits
- binoculars and other field monitoring equipment as necessary
- digital cameras
- compass/GPS

## **Evaluation Criteria: Community Outreach**

### *General Recommendation*

A biology program should demonstrate evidence of community outreach. Recommendations for providing community outreach include providing human and physical resources.

### *Examples of Providing Human Resources*

Biology programs may provide personnel, both faculty and students, to assist community science activities such as science contests, Olympiads or fairs, career days, advising/mentoring K-12 students, grant preparation assistance, after-school clubs, and summer camps. Biology programs should promote professional connections, involvement and development with K-12 biology/life science teachers through local, state, or regional outreach programs (such as NABT's state, regional, and national outreach).

Programs may also choose to offer their scientific expertise to the community through workshops, lectures, and demonstrations and by offering pre-college student internships.

Finally, members of the program can show evidence of community outreach through participation in community service organizations and events.

### *Examples of Providing Physical Resources*

Biology programs may offer community service through the loan of equipment and materials to pre-college teachers, including texts, laboratory procedures, software, visuals, and specimens.

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