

Liberal Arts: Biology Program Review 2013-2014

Compiled by Ken Thomas

With Assistance from

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Liberal Arts: Biology Mission

- *The Liberal Arts/Biology Program is designed to **prepare students** for further study towards the **bachelor's degree in biology** by providing coursework and laboratory experiences in biology and other natural sciences, as well as a background in mathematics and the liberal arts (drafted 2007).*
- *This is primarily a **transfer** program*

LA:Bio - Program of Studies

REQUIREMENTS	ELECTIVES
Introductory Biology I	Behavioral Science (6 credits)
Introductory Biology II	Fine & Performing Arts/Foreign Language/Philosophy & Religion (6 credits)
General Chemistry I	History/Government (6 credits)
General Chemistry II	Literature (6 credits)
English Composition I	Biology Elective (4 credits) (Recommended Biology Electives BIO103 and BIO104 or higher, except BIO115)
English Composition II	Computer Science <u>or</u> Biology Elective (3 or 4 credits) (Recommended Computer Elective CIS110 or higher, <u>or</u> Recommended Biology Electives BIO103 and BIO104 or higher, except BIO115)
Calculus I <u>or</u> Calculus for Business/Social/Life Sciences	
Calculus II <u>or</u> Statistics	
Applied Physics I <u>or</u> Engineering Physics I	
Applied Physics II <u>or</u> Engineering Physics II	

LA: Bio Facilitates NECC's Core Values

- **Student Engagement** – Specific instructors in the program engage students as active learners, some involvement in Science Club
- **Personal and Professional Growth** – Office of Professional Development provides solid institutional support to LA:Bio Faculty
- **Access and Opportunity** – New lab and those planned for renovation are/will be handicapped accessible
- **Excellence** – Cutting edge educational techniques are employed by several instructors in program

LA: Bio Facilitates NECC's Strategic Goals

- **Goal 1: Develop a comprehensive urban campus in downtown Lawrence** - The newly developed biology laboratories on the Lawrence Campus will enable us to deliver several core biology courses to those students in this urban environment.
- **Goal 4: Improve Student Career Preparation** - This program is often viewed as a “feeder” for B.S. Biology programs to local Colleges and Universities with several articulation agreements in place including Merrimack College, Salem State College and The University of Massachusetts, Lowell.

THE PAST

Summary

Liberal Arts: Biology

Program Review (2007-08)

- Ruth Young Biology Program Coordinator, Team Leader, NECC
- Marcy Yeager Chair of Natural Sciences, NECC
- Mariana Vilhena Instructor, Natural Sciences, NECC
- Stephen Mathis Professor, English Department, NECC
- Gary Heisermann Assistant Professor, Biology, Salem State College
- Peter Gaines Assistant Professor, Biology, UMass Lowell

2007-08 Findings -The Good



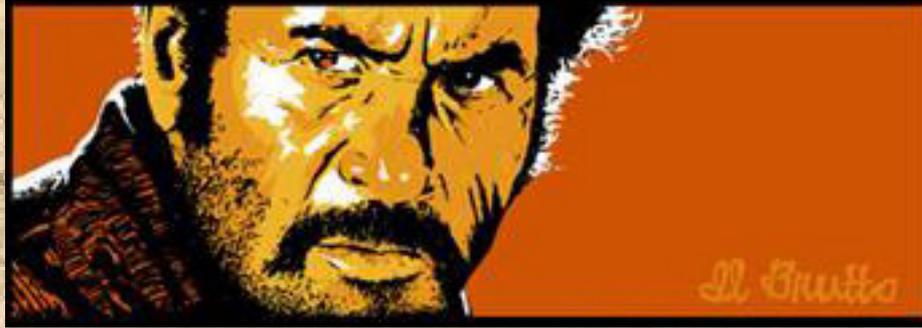
- Biology faculty are dynamic, diverse, highly trained & professional
- Increasing enrollment, good minority student interest
- New course offerings for biology students
- Academic support in the form of a student study lab and tutoring available

2007-08 Findings - The Bad (abated)



- Lab safety procedures not documented
- Inadequate number of chemistry/physics faculty
- Outdated technology in classroom & labs
- Outdated laboratories

2007-08 Findings - The Ugly



- Retention of LA:Bio students decreased (54% drop out of program)
- Department's financial resources were inadequate for anything more than basic operations
- Inadequate ability to deal with underprepared students
- Low number of graduates

THE PRESENT

Liberal Arts: Biology

Program Review (2013-14)

- Ken Thomas Professor of Biology, Team Leader, NECC
- Mark Clements Assistant Professor of Biology, NECC
- Diann Cahaly Instructor of Biology, NECC
- Mike Cross Chair of Natural Sciences, NECC
- Paul Cavan Professor of Criminal Justice, NECC
- R. David MacLaren Associate Professor of Biology, Merrimack College

How Do We Compare?

- Number of LA:Bio students **doubled**
 - 2003-2007 - Average Total students enrolled in program = 47
 - 2008- 2011 - Average Total students enrolled in program = 93
- Average Retention Rate **increased** slightly
 - 2003-2007 - 46%
 - 2008- 2011 - 49%
- Average Four Year Transfers per year **doubled**, but % transfers remained **constant**
 - 2003-2007 - 7 (15%)
 - 2008- 2011 - 14 (15%)

How Do We Compare?

- Average Graduates per year **increased**
 - 2003-2007 - 1
 - 2008-2011 - 3
 - 2010-2013 - 5
- Graduation Rate **Increased**
 - 2003-2007 - 2.5%
 - 2008- 2011 - 3.5%

Current Findings

- Biology transfer agreement has reached International Status (Bath University, England)
- Biology Program Coordinator position has been absent for several years
 - Program is missing a direct faculty leader,
 - lacks coherency
- Investment in a Biology Student-Support Group may improve student success/retention

Current Findings, cont.

- Lack of a departmental website:
 - Hampers collaboration of NECC science faculty with external colleagues
 - Provides a disconnect between the community, our students and our science programs
- Incentive for faculty research programs:
 - will promote professional development for science faculty
 - improve science literacy among students

Recommendation 1

- Reinstatement Biology Program Coordinator Position
 - Oversee Biology program
 - Facilitate Biology Student Support Group
 - Provide recognizable contact person for students in program

Recommendation 2

- Develop autonomous department website (recommendations from Natural Sciences Faculty, 2012)
 1. Linked to NECC within 1 level of the homepage in a link entitled "Natural Sciences Department"
 2. Academically driven, with content under FULL DIRECT control of the natural science department
 3. Listing of natural sciences programs with links to:
 - a) Descriptions of programs of study,
 - b) course descriptions,
 - c) course outcomes,
 - d) descriptions of what can be done with that degree & department alumni,
 - e) articulation agreements
 4. Faculty profiles and links to faculty webpages
 5. Facilities Link to show students lab space and field research stations (e.g. Quarrybrook)
 6. NECC science activity outside the classroom
 7. What's new in our department?
 8. Current science news

Recommendation 3

- Provide Incentive for ongoing faculty research programs that involve students
 - There is a lot of local talent with expertise in doing research (8 Ph.D.'s in the Natural Sciences Department)
 - Accessible national resources for research in community colleges
 - In addition to improved local resources, support is needed at the institutional level, particularly in the form of changes in the faculty reward and support systems (Anderson et al., 2011).
 - AAAS/NSF Vision and Change for Biology Education (next slide)
 - CCURI – Community College Undergraduate Research Initiative (later slide)

VISION AND CHANGE IN UNDERGRADUATE BIOLOGY EDUCATION: A CALL TO ACTION (2009)

- REPORT OF A NATIONAL CONFERENCE ORGANIZED BY THE AAAS WITH SUPPORT FROM THE NATIONAL SCIENCE FOUNDATION
- This has become a guiding principle for educational reform in biological sciences, embraced by a large number of post secondary educators
- HHMI, NIH, NSF, AAAS pioneered this initiative in 2007.

The Community College Undergraduate Research Initiative (CCURI)

- American Association of Community Colleges (AACC) (2007)
 - 11.6 million students were enrolled at a community college (7.3 full-time).
 - Equals half of the U.S. postsecondary student population & highlight the increasing impact that community colleges are having on the education of postsecondary students in the United States
- The Community College Undergraduate Research Initiative (CCURI)
 - Directly Linked to NSF's Vision and Change
 - Uses an inquiry-based teaching model where students are exposed to real world science through a case study in an introductory course followed by a hands-on research experience resulting from questions about or related to the case.
 - CCURI is currently providing resources for 26 institutional partners (introductory workshops/conferences that build regional /national collaborations, start-up supplies and faculty development opportunities.
- <http://www.cur.org/urcc/> & <http://www.ccuri.org/content/home>

George R. Boggs

President and CEO, American Association of Community Colleges

- “I encourage college leaders to find ways to support the energetic faculty members who want to use research as a way to promote student learning.”
- His list of reasons for supporting undergraduate research include:
 - The need to increase the number of students (especially minority students) majoring in science, technology, engineering, and math (STEM) fields
 - The need to promote better understanding of STEM fields;
 - The need to improve student engagement and persistence in college;
 - The need to assist people in becoming better consumers of research;
 - The need to develop better understanding of the scientific method and research processes;
 - The potential for institutional recognition.
- Research is teaching for the faculty and learning for the students, it is also a motivator and a form of professional development for faculty members and potentially a source of recognition for the institution.

Recommendation 4

- Replace Liberal Arts: Biology with A.S. in Biological Sciences
 - Selective criteria for admission
 - Increase biology elective requirements
- Four separate Tracks
 - PreMed/PreVet
 - Cell/Molecular
 - Ecology/Evolution/Behavior
 - Marine

A.S. Biological Sciences

CORE REQUIREMENTS	ELECTIVES
Biology I (Biodiversity) [a new course]	<p>Electives will include a suite of open electives and 8-12 credits of biology electives that would be geared specifically toward their chosen track</p> <ul style="list-style-type: none"><li>• PreMed/PreVet – Human Anatomy & Physiology I & II<li>• Cell/Molecular - Cell Biology and Molecular Techniques [a new course]<li>• Ecology/Evolution/Behavior – Ecology, Animal Behavior [a new course]<li>• Marine – Marine Biology, Invertebrate Biology [a new course] or Animal Behavior [a new course] or Ichthyology [a new course].
Biology II (Cell / Biochemistry) [a new course]	
General Chemistry I	
General Chemistry II	
English Composition I	
English Composition II	
Calculus I <u>or</u> Calculus for Business/Social/Life Sciences	
Calculus II <u>or</u> Statistics	
Applied Physics I <u>or</u> Engineering Physics I	
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Science Articulation Meeting

- Held at UMass, Lowell, 5 October 2012
- Stand Alone A.S. in Biology was previously proposed by NECC's Dean of Academic Support Services, Articulation, and Transfer (Grace Young)
- This idea supported by NECC's Assistant Dean of Foundational Studies and Liberal Arts & Sciences (Noemi Custodia-Lora)
- Discussed at this meeting and in principle was agreed upon by all involved in this conversation that this should be pursued at NECC

Advantageous changes to an AS in Biology (Grace Young)

- LA:Bio not currently viewed as a STEM Program
- As an Option in Liberal Arts, the caliber of the program is greatly diminished
- In order for students to be eligible for Science-based or STEM scholarships this needs to be an AS degree
- No other Community College in close proximity has an AS in Biology, so we should consider taking advantage and properly marketing our program as a STEM Program
- Bunker Hill CC has a program-see link below:
- <http://www.bhcc.mass.edu/programsofstudy/index.php>
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Advantageous changes to an AS in Biology (Noemi Custodia-Lora)

- AS in Biology will provide a more intentional, focused path for students.
- It should be relatively easy to implement because most of the courses required for the program are already in place.
- It will lead to the creation of additional courses leading to more science options for major and non-major students.
- It may attract/retain students interested in a Biology program. Anecdotally, in the past students have complained about insufficient science course offerings that would count for their Biology major once transferring to a 4-year school. Thus promoting early transfer before graduating from NECC.

A.S. BIOLOGICAL SCIENCES

- PreMed/PreVet – Human Anatomy & Physiology I & II
- Cell/Molecular - Cell Biology and Molecular Techniques [a new course]
- Ecology/Evolution/Behavior – Ecology, Animal Behavior [a new course]
- Marine – Marine Biology, Invertebrate Biology [a new course] or Animal Behavior [a new course] or Ichthyology [a new course]

