COLLEGE COURSE PROPOSAL FORM

Department/College: Biological Sciences / Humanities and Natural Sciences

Chairperson: Don Hauber

Course Title: BioInquiry with subtitles to denote different themes (e.g., BioInquiry: Investigating Arthritis).

Course Number: BIOL A101

Term: Every fall semester

Credit Hours: 3 credit hours, required in the major

Effective Term: Fall 2016

Course ID: BIOL A101

Contact Hours: 3 hours

Grade Type: Letter grade

Maximum Capacity: 24

Activity Type: BioInquiry is a hybrid of traditional lecture and laboratory courses in that it integrates focused lectures, small group discussions, and experiential activities in the lab and field. The highly experiential nature of BioInquiry is why enrollment is capped at 24 students.

Interdisciplinary Classifications: None

Pre-requisites/Registration Controls: BioInquiry will be a required course for all first-semester Biology freshmen. Transfer students will be required to complete Bioinquiry or a course equivalent. Students withdrawing from or failing Bioinquiry will be required to complete it in the following spring or fall semester.

New Resources and Fees

a. **If this is a revised course, was there a course fee?** BioInquiry will replace Biology Freshman Seminar, which did not have fees because it was lecture-based and did not include expensive experiential activities in the lab or field.

b. **Will a course fee be required for this course?** We propose a $100 lab fee to cover the costs of experiential activities in the lab and field. Collected fees will be used to pay for recurring costs such as printing laboratory manuals, replacing consumable chemicals and supplies, and transporting students to field locations such as Jean Lafitte National Historical Park and Reserve.

c. **Are new resources needed for implementing this course?** Biology will need to offer four sections of BioInquiry with 24 students in each section in order to accommodate the ≈60-75 students who would otherwise be enrolled in a single, large section of Biology Freshman Seminar each fall semester. Strategies for minimizing the costs of teaching these extra sections are discussed below. Newly renovated teaching laboratories in Monroe Hall provide the state-of-the-art spaces needed to implement BioInquiry.

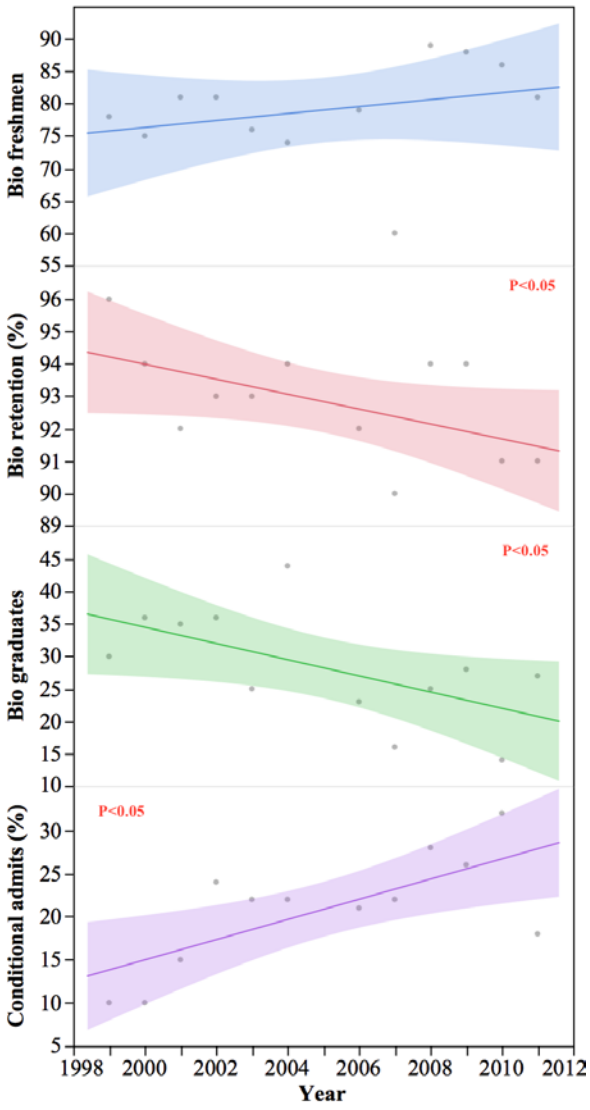
Course Description:

This course engages students in the process of scientific inquiry while providing a framework for academic success. Students will build collaboration, experimental design, quantitative reasoning, and communication

skills while exploring a theme that instills awareness of the interdisciplinary nature of biology and its relationship to society. (344 characters)

I. **Justification:**

The Department of Biological Sciences completed a comprehensive program review in 2013 and found that retention and graduation rates of Biology majors have declined significantly over much of the past two decades. These concerning trends largely reflect admission of increasing numbers of academically underprepared students who make significantly lower grades in the first required biology course, are twice as likely to repeat this course, are significantly less likely to graduate, and graduate with significantly lower GPAs than regular admits. Biology strongly supports Loyola's mission of promoting social justice by encouraging the recruitment and education of first generation students, especially those from groups who are traditionally underrepresented in the sciences. Changes in how millennial students supposedly learn and interact with information may be another factor contributing to declines in student retention and academic success.



A central outcome of our program review was recognition of the need to critically review and revise the Biology major curriculum in order to better meet the needs of Loyola's changing student population. We therefore initiated a two-year review of primary and secondary literature related to STEM education and pedagogy (see Appendix 1). Our starting point was the highly influential AAAS document "Vision and Change in Undergraduate Biology Education: a Call to Action." Biology faculty participated in over a dozen lively discussions during coveted Tuesday-Thursday windows and also conducted two separate full-day campus workshops that featured national STEM education experts. The overarching goal of these meetings, discussions, and workshops was to identify cost-effective and high-impact teaching practices to improve recruitment, retention, and student success at Loyola.

The primary finding of the curriculum review process is that our curriculum should be restructured in order to place much greater emphasis on development of the fundamental skills and competencies needed by all life scientists, that these skills and competencies should be introduced at the earliest possible opportunity, that these skills and competencies should be reinforced regularly throughout the curriculum, and that this restructuring should be done without sacrificing academic rigor. As noted in Vision and Change, "in addition to understanding concepts, undergraduates must have opportunities to develop core competencies to better prepare them to practice biology, as well as to address the complex biology-related issues that our society faces." Relatively small, first-year seminars have proven to be one of the most effective and high-impact educational practices available and an emerging trend in STEM education is to implement *discipline-specific* leader courses that introduce first-semester college students to the skills and competencies needed to promote

long-term academic *within the major*. These leader courses should focus on one or a few exciting topics or themes rather than superficially covering a large number of topics. Focal themes should be examined at all levels of organization – ranging from molecules to ecosystems – so that students gain an early appreciation of the unifying concepts of Biology. Highly selective schools such as Grinnell College and University of Richmond have adopted discipline-specific leader courses because they provide first-semester students that have very different levels of academic preparation and diverse learning styles with an academically rigorous introduction to Biology (see Appendix 2).

In 2006, Biology implemented one of Loyola's first first-year experiences – Biology Freshman Seminar – in order to address early concerns about declining academic success. This one-credit hour course was used to facilitate academic advising and to cost-effectively introduce large numbers of students to the major curriculum, to the academic support services available on campus, and to Biology faculty and their research programs. However, the format of this large seminar did not permit an introduction to the basic scientific skills and competencies required for the major. Given that retention and graduation rates continue to decline, **we herein propose to replace Biology Freshman Seminar with BioInquiry** so that first-semester Biology majors will immediately begin to develop the foundational skills and competencies needed to ensure long-term academic and professional success.

II. **Impact on the curriculum:**

A. **Review your current course offerings and requirements in light of the proposed change. How will the proposed change or changes improve your program and enhance the educational outcomes you seek to accomplish?** Biology's major curriculum and associated activities (e.g., collaborative undergraduate research) were designed to graduate competent and competitive students who: possess knowledge and understanding of the fundamentals of biology; use and evaluate the scientific literature; are proficient in laboratory and field techniques; apply the scientific method to appropriate questions; and communicate science effectively in oral and written form. Significant changes to this curriculum should be the result of thoughtful deliberation, should be based upon sound educational and pedagogical theories and practices, and should have realistic and assessable goals. BioInquiry is the culmination of extensive and thorough review, reflection, and discussion of relevant primary and secondary literature on STEM education. Rather than operating in a pedagogical vacuum, Biology faculty collaborated with leading innovators in science education to identify cost-effective and high-impact educational practices. The culmination of this effort is development of BioInquiry – a discipline-specific, first-semester course that provides students with a framework for academic success while developing collaboration, experimental design, quantitative reasoning, and scientific communication skills. The ultimate goal of BioInquiry is to help improve recruitment, retention, and academic success of students majoring in Biological Sciences. Note that our curriculum review process is ongoing and subsequent modifications will build upon and reinforce the solid foundation provided by BioInquiry and thereby further contribute to improving academic success.

BioInquiry will be offered during the fall semester with a possible section in the spring for transfer students. This course is required for Biology majors and is designed for first-semester freshmen, but is open to students from other majors, as well. Students with an AP score in Biology of 4-5 can elect to waive the course. Transfer students, who have equivalency from other course-work will not be required to take the course. BioInquiry can be used to fulfill the introductory natural science requirement of the Loyola Core, which should help students who decide to switch from Biology to a non-science major.* BioInquiry has been developed with the goal of helping our majors without adversely affecting students majoring in other disciplines. We plan on offering Cells & Heredity and Biology of Organisms lectures

and labs during both the fall and spring semester, so these students could start the next two courses in the Biology core curriculum in the order they choose. The table below illustrates the current and proposed core sequence of science and math courses taken by Calculus-eligible Biology majors during their first two years at Loyola. Calculus-eligibility is based upon placement scores or completion of Pre-Calculus and students may not take major courses in Biology, Chemistry, or Physics until they are Calculus-eligible. It is important to note that currently *more than a third* of incoming Biology majors are ineligible to take Calculus.
*the highlighted passage was edited since the last revision

	Year 1		Year 2	
	Fall	**Spring**	**Fall**	**Spring**
Current	BFS / C&H	BOO	E&E	Biology electives
	Gen Chemistry I	Gen Chemistry II	Organic Chemistry I	Organic Chemistry II
	Complete Calculus I and Statistics course during first two years			
Proposed	BioInquiry	C&H or BOO	C&H or BOO	Ecology & Evolution
	Gen Chemistry I	Gen Chemistry II	Organic Chemistry I	Organic Chemistry II
	Complete Calculus I and Statistics course during first two years			
	C&H = Cells & Heredity lecture and lab			
	BOO = Biology of Organisms lecture and lab			

We have identified several benefits associated with requiring Biology freshmen to take BioInquiry during their first semester at Loyola. The single greatest benefit is that Biology freshmen will immediately begin to construct a framework for academic success by developing collaboration, experimental design, quantitative reasoning, critical thinking and scientific communication skills.

The second major benefit of this course is that it will build a sense of community among all incoming biology majors. In the absence of a pre-requisite or math placement requirement for BioInquiry, all first-semester Biology freshmen will now start out in the same academic cohort and separation based on academic preparation will be eliminated. A key benefit of first-year experiences is that they provide a great opportunity for students to interact, socialize, and develop a network of peers. Discipline-specific first-year experiences have the added benefit of helping to build a stronger sense of community and belonging within the major, which is especially important to the long-term academic success of students from groups traditionally underrepresented in the sciences. Group exercises are an integral part of BioInquiry and provide students with early opportunities to gain experience with collaboration and to appreciate the importance of diversity in the scientific process.

In an ideal world, Biology majors would start their college career with at least one year each of Physics and Chemistry so that they would have a solid understanding of key physical processes before starting their Biology courses. The time constraints of a four-year curriculum instead require that Calculus-eligible Biology majors take both introductory Biology and Chemistry courses during their first semester. Taking BioInquiry during the fall semester now allows Calculus-eligible Biology majors to complete one semester of General Chemistry before taking subsequent Biology courses, which is especially critical when studying processes at the cellular and molecular level.

Another advantage of offering BioInquiry during the fall semester is that many of the incoming Biology freshmen who are not Calculus-eligible will be able to complete Pre-Calculus and “catch up” with their peers during the spring semester. These students will be able to continue progressing through their Biology core and elective courses in the same academic cohort and thereby maintain and strengthen the

peer networks they formed in BioInquiry.

The quantity and quality of research that informs reform in STEM education is wanting, which understandably leads to disagreements about the value of implementing teaching innovations such as first-year experiences. One concern is that first-semester courses, even those that are specific to a discipline, lack academic rigor and reduce the amount of time available to cover the full range of topics taught in traditional introductory courses. Our reading of the literature indicates that this is not the case for first-year courses in general or for discipline-specific first-year courses in particular. Instead, most research indicates modest to substantial gains in understanding of key concepts and long-term academic success. A mid-term assessment of experimental sections of BioInquiry being offered during Fall 2015 indicate that students perceived that 95% of the biological and analytical concepts being covered either built upon concepts learned in high school or were altogether new. That is, there was little redundancy or overlap with the material learned prior to coming to Loyola. Another concern about requiring students to take BioInquiry is that it slows down their progress through the Biology curriculum. The reality is that a significant number of our majors cannot take introductory Biology courses because of math deficiencies and many of the students who are Calculus-eligible end up performing poorly in STEM courses because they lack the fundamental skills and competencies that are being emphasized in BioInquiry. As noted below, our Biology core curriculum will remain relatively small compared to Biology core curricula at other universities. One last concern is that we may lose the interest of exceptional students. To address this concern, Honor students majoring in Biology will be given the option of taking an introductory course (Cells and Heredity) at the same time as BioInquiry. We do not advocate having honor students skip BioInquiry because we want to build a set of consistent skills in all students and because honor students play an important role as peer-mentors, especially during group activities.

B. **How will proposed change impact the major/adjunct/elective hour distribution requirement for the major or program?** We are replacing a one credit hour core course with a three credit hour core course. This change will increase the Biology core credits from 12 to 14. We propose to offset this increase by reducing Biology elective credit from 22 to 20. BioInquiry will not affect adjunct distribution requirements for Biology majors. An important note here is the Biology Teaching Certificate track is currently 128 credits so strategy 2, increasing the overall major credit hours, so we will decrease the Biology elective credit to maintain the overall credits at 128 (see attached revised DPCL's)

III. **Impact on Frequency of course offerings:**

A. **Specify whether or not the offering of the new course will increase the number of courses or sections offered by the department during the semester in which this course is offered or during the following year.** BioInquiry will replace Biology Freshman Seminar and become the first course in the core curriculum for Biology majors. Biology will need to offer three sections of 24 students each to accommodate the 60-75 students who would otherwise be enrolled in a single, large section of Biology Freshman Seminar each fall semester. We will reduce the number of sections of Science in Context courses and advanced Biology electives offered during the fall but still accommodate students in other departments.

B. **Specify, if there is no increase in the number of courses offered, which course(s) or section(s) will be dropped in a given semester to accommodate the frequency with which this course will be offered.** BioInquiry will replace Biology Freshman Seminar.

C. Specify what effect the new course will have on enrollments in other courses or sections within the

department and whether or not offering this course will prevent an important or required course from being offered in a given semester. BioInquiry will become the first major course for all incoming Biology freshmen. Biology freshmen will then move on to the next course in the Biology core curriculum during the spring semester. This change in our curriculum will not prevent any important or required courses from being offered.

D. **Is there a service-learning component? If yes, please attach a memo from the director of service learning describing this component.** BioInquiry does not include a service-learning component at this time.

E. **Explain how this proposal does or does not impact other departments, especially those serviced by your department or program and those that provide adjunct service to your department or program**. BioInquiry will not adversely affect students in other departments because they are not required to take BioInquiry before taking other core and elective Biology courses. We will endeavor to offer our remaining core courses during both the fall and spring so that these students may enroll according to their curricular needs. BioInquiry will not adversely affect course offerings in other departments. For example, Biology freshmen who are eligible to take Calculus I based on math placement criteria are still expected to enroll in General Chemistry I lecture and lab during their first semester. Indeed, one important motivation for creating BioInquiry is to help our majors gain a better understanding of fundamental chemical principles in order to better prepare them for the study of living systems, especially at the scale of molecules and cells.

F. **Attach a complete and functional syllabus for the course.** Appendix 4 contains syllabi for sections of BioInquiry being offered experimentally during Fall 2015. These syllabi demonstrate how BioInquiry uses different themes to engage students in the process of scientific inquiry.

IV. **Assessment plan:**

A. **Student learning outcomes for this course that are tied to course content and assignments. Key Question: What do you want student to know or be able to do at the end of this course?** BioInquiry will engage students in the process of scientific inquiry while providing a framework for academic success at Loyola. Students will gain proficiency in experimental design, quantitative reasoning, scientific communication, and collaboration skills. Contemporary research questions will span cellular and molecular biology, physiology, organismal biology, ecology, and evolution. Each section of this course explores a unique theme that will instill an awareness of the interdisciplinary nature of biology and its relationship to societal issues. Students will also learn about resources available on campus that help promote academic success. Specific learning outcomes are provided in the table below.

B. **Methods, tools, instruments that will be employed to measure success. Describe methods for measuring inputs and outputs. Key Question: What the indicators of learning and course effectiveness?**

A. Learning outcomes for Biology courses	B. Instruments used to assess learning outcomes in BioInquiry
Students will apply critical thinking skills to the experimental design process	• This will be achieved through hands-on lab investigations and case studies.
Students will demonstrate introductory level scientific communication skills.	• This will be achieved through class discussions, written assignments, oral presentations, and a final poster presentation.

Students will demonstrate basic level information literacy.	• This will be achieved by discussing the scientific literature and analyzing data.
Students will learn to compassionately engage with the world.	• This will be achieved by discussing the benefits and outcomes of science and the ethical considerations of the practice of research.
Students will demonstrate a working knowledge of selected core concepts in biology.	• This will be achieved through readings, discussions, quizzes, and assignments.
Students will demonstrate knowledge of resources and practices that will support academic success in biology.	• This will be achieved through an assignment focused on learning about campus resources.

C. **Criteria that will be used to measure accomplishments or outcomes. Key Question: How will we know that we are having a positive impact on our students' learning?** We will assess student performance using the above instruments and test for temporal change to evaluate changes in student learning. We have already developed and implemented a Student Assessment of their Learning Gains (SALG) to provide a before-after student-centered assessment. Finally, we will continue to evaluate temporal changes in grades and rates of recruitment, retention, and graduation in BioInquiry and other core and elective Biology courses as part of overall assessment of the Biology curriculum.

D**. Frequency and schedule of assessment of student learning in this course.** Assessments will be performed annually in conjunction with review of other aspects of the Biology curriculum.

E. **Describe mechanisms that will be in place to ensure continuous improvement of course.** Student course evaluations are the primary mechanism used to evaluate trends in instructional effectiveness and these evaluations provide feedback that is used to improve courses. SALG surveys will complement course evaluations. Biology also uses an ETS field exam to track student learning.

F. **Structure and process for administrative and academic oversight of course.** The Chair of Biological Sciences works closely with our departmental Curriculum & Assessment committee to ensure that courses are academically rigorous and meet learning objectives.

G. **Impact of course on accreditation or certification.** Biology does not have an official accreditation or certification process.

V. **Impact on Budget:**

A**. Staffing. Is current staffing sufficient or will new faculty be needed (whether full-time or part-time)?** Biology will need to offer three sections of 24 students each to accommodate the ≈60-75 students who would otherwise be enrolled in a single, large section of Biology Freshman Seminar each fall semester. This will require two additional course sections. Since ordinary faculty will teach the Bioinquiry sections, extraordinary (or part-time?) faculty will be used to teach the laboratory and Loyola Core courses otherwise taught by ordinary faculty involved in the course. We anticipate that this increase will be offset by a reduction in the number of major elective courses that Biology majors are required to take in order to graduate. Biology will continue to fully participate in the Loyola Core and teach a broad range of major elective courses.

B. **Library Support. Describe how library support will be affected by this proposal. Include name of library liaison and date this proposal was discussed with liaison.** Some of the library-based activities

currently included in other core Biology courses will be shifted to BioInquiry, so this change should not increase the need for library support. Students in BioInquiry are required to use SPSS to analyze and visualize data collected during experiential activities. We have collaborated with Jim Hobbs, the library liaison to Biology, to develop support pages for the use of SPSS. Note that these support pages are available to all campus users of SPSS. Mr. Jim Hobbs has already participated in the experimental offering of BioInquiry this fall (2015) and is therefore aware of the library component in the proposal. Nevertheless, a copy of this proposal will shared with Mr. Hobbs.

C. **Support services. Will the proposed change require additional support services (Media Services audio/visual: typing/secretarial, computer services, computer time)?** BioInquiry should not increase demand for support services.

D. **New equipment. Does the proposed change presuppose the purchase of new equipment or software, whether for support or instruction?** Recent renovation of teaching laboratories and updating of teaching equipment and instrumentation provides the infrastructure needed to implement innovative STEM courses such as BioInquiry. No additional spaces or equipment should be needed.

E. **Is a student fee requested?** We propose to require a $100 lab fee to cover the costs of experiential activities in the lab and field. Collected fees will be used to print and provide laboratory manuals, replace consumable chemicals and supplies, transport students to field locations such as Jean Lafitte National Historical Park and Reserve, and support other recurring expenses.

F. **Additional physical space. Does the proposed change require additional physical space (for classes or labs) or modifications of existing physical plant space?** BioInquiry will be taught in a laboratory in order to accommodate experiential learning activities. We propose to teach BioInquiry in one of the natural science Common Curriculum labs on the sixth floor of Monroe Hall as scheduling permits. If this lab is not available, we will teach BioInquiry in our teaching labs on the fifth floor of Monroe Hall.

G. **Impact on other departments. How will the proposed change impact the staffing, equipment, and service budgets of other departments?** BioInquiry should not adversely affect staffing or budgets in other departments.

Appendix 1. A sample of the literature that Biology faculty reviewed and discussed as part of an intensive and extensive curriculum review process.

American Association for the Advancement of Science. 2011. Vision and change in undergraduate biology education: a call to action. Washington, DC.

Barefoot, BO. 2000. The first-year experience. About Campus 4:12-18.

Derting, TL, and D. Ebert-May. 2010. Learner-centered inquiry in undergraduate biology: Positive relationships with long-term student achievement. CBE-Life Sciences Education 9.4:462-472.

Freeman, S, D Haak, and MP Wenderoth. 2011. Increased course structure improves performance in introductory biology. CBE-Life Sciences Education 10.2:175-186.

Gasper, BJ, and SM Gardner. 2013. Engaging students in authentic microbiology research in an introductory biology laboratory course is correlated with gains in student understanding of the nature of authentic research and critical thinking. Journal of Microbiology & Biology Education 14.1:25.

Goldey, ES, CL Abercrombie, TM Ivy, DI Kusher, JF Moeller, DA Rayner, CF Smith, and NW Spivey. 2012. Biological inquiry: a new course and assessment plan in response to the call to transform undergraduate biology. CBE-Life Sciences Education 11.4:353-363.

Gottesman, AJ, and SG Hoskins. 2013. CREATE cornerstone: introduction to scientific thinking, a new course for stem-interested freshmen, demystifies scientific thinking through analysis of scientific literature. CBE-Life Sciences Education 12.1:59-72.

Hartley, R, R James, and C. McInnis. 2005. The first year experience in Australian universities: Findings from a decade of national studies. Centre for the Study of Higher Education, University of Melbourne.

Hurtado, S, CB Newman, MC Tran, and MJ Chang. 2010. Improving the rate of success for underrepresented racial minorities in STEM fields: Insights from a national project. New Directions for Institutional Research148:5-15.

Ryan, MP, and PA Glenn. 2004. What do first-year students need most: Learning strategies instruction or academic Socialization? Journal of College Reading and Learning 34.2:4-28.

Simurda, MC. 2012. Does the transition to an active-learning environment for the introductory course reduce students' overall knowledge of the various disciplines in biology? Journal of Microbiology & Biology Education 13.1:17-20.

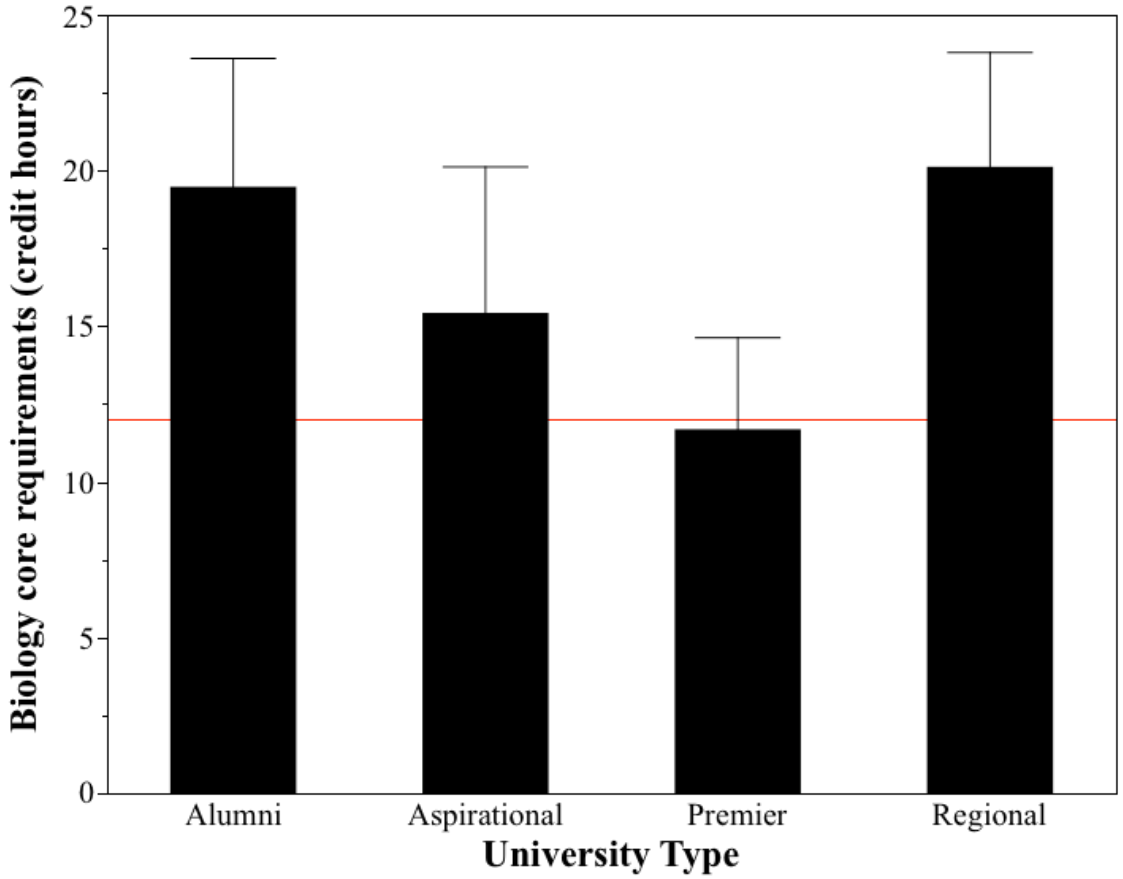
Tinto, V. 1997. Colleges as communities: Taking research on student persistence seriously. The Review of Higher Education 21.2:167-177.

Ulriksen, L, LM Madsen, and HT Holmegaard. 2010. What do we know about explanations for drop out/opt out among young people from STM higher education programmes? Studies in Science Education 46.2:209-244.

Wood, WB. 2009. Innovations in teaching undergraduate biology and why we need them. Annual Review of Cell and Developmental 25:93-112.

Appendix 2. Mean (+1 SE) number of credit hours in the core curriculum of Biology programs attended by Biology faculty (Alumni); at Loyola's aspirational schools; at elite universities such as Grinnell, Oberlin, Reed, University of Richmond, and Williams (Premier); and by universities in our geographic region. Data were updated September 2015 and include general programs and programs specializing in Ecology & Evolutionary Biology, Cell & Molecular Biology, etc. Raw data are available upon request (Jordan@loyno.edu).

The core curriculum at Loyola currently consists of 12 credit hours, which is the same size as core curricula at highly selective universities. Increasing the Biology core curriculum to 14 credit hours by replacing Biology Freshmen Seminar with BioInquiry would still leave our core curriculum in the range of elite universities.



Appendix 3. Descriptions of first-semester, discipline-specific leader courses that are similar to BioInquiry and that are currently being offered at elite universities.

GRINNELL COLLEGE

BIO 150 – *Introduction to Biological Inquiry* *(4 credit hours lecture and lab). An introduction to how biologists pose questions, design experiments, analyze data, and communicate scientific information, for prospective biology and biological chemistry majors as well as nonmajors. Although individual sections will have different topics and formats, all sections will involve intensive student-directed investigation and include a laboratory component. For current course content please see the variable topic course listing below or search the online live schedule of courses…Welcome to Grinnell's first course in biology, Bio-150 Introduction to Biological Inquiry! As a consequence of our growing understanding of how people best learn scientific principles, we have designed this course to be distinct from most college introductory biology courses. You have probably noticed that each section focuses on a different biological problem: instead of expecting all students taking Bio 150 to learn exactly the same list of biological facts, we expect all students to practice the same skills, while investigating interesting biological questions. It's not that facts are unimportant: they are fundamental to investigating and understanding life. Research on learning shows, however, that people are more likely to remember facts, understand concepts and apply them to new situations when they use them.*

UNIVERSITY OF RICHMOND

BIO 199 – *Introduction to Biological Thinking* *(4 credit hours lecture and lab). An introduction to how biologists pose questions, design experiments, analyze data, evaluate evidence, and communicate scientific information. Individual sections will have different topics and formats, but all sections will involve intensive student-directed investigation and include a laboratory component. Required for prospective biology majors and biochemistry and molecular biology majors. Three lecture and three laboratory hours per week.*

Appendix 4. Syllabi for sections of BioInquiry being offered experimentally during Fall 2015 by Drs. Kimberlee Mix and Aimee Thomas.

BioInquiry: Investigating Arthritis
Biol A194; Sections 001 & 002
Fall 2015

Class meetings: Tuesdays and Thursdays
9:30-10:45AM (section 001)
11:00-12:15PM (section 002)
Location: Monroe Hall 653
Required textbook: Campbell Biology, 10th Edition by Reece, Urry, Cain, Wasserman, Minorsky, Jackson; ISBN: 9780321775658. Mastering Biology access is optional.
Supplemental readings: To be posted on Blackboard (Bb)
Additional materials: 3-ringed binder, calculator, notebook, lab coat

Instructor: Dr. Kim Mix
Office: MO 467
Phone: 865-2214
Email: kmix@loyno.edu
Office hours: By appointment, Thurs – 2-3pm, Fri – 11am-noon; and virtually on Bb

Course Description: BioInquiry is the first course in the core biology sequence, required by all first-year biology majors. This course aims to engage students in the process of scientific inquiry while providing a framework for academic success at Loyola. Students will gain proficiency in experimental design, quantitative reasoning, scientific communication, and collaboration skills. Contemporary research questions will span cellular and molecular biology, physiology, organismal biology, ecology, and evolution. Each section of this course explores a unique theme that will instill an awareness of the interdisciplinary nature of biology and its relationship to societal issues.

Investigating Arthritis: This section of BioInquiry examines arthritis as a major cause of disability and as an emerging target for personalized medicine. We will examine the structure and function of joints and introduce the major tissues and cell types involved in arthritis. Discussions and collaborative experiments will highlight environmental, genetic, and molecular factors that contribute to disease. The molecular basis of new therapeutic strategies will be explored in scientific articles and datasets. Students will be exposed to research methods used to examine the mechanisms of arthritis and engage in the process of discovery through group investigations.

Learning Outcomes:

1. Students will apply critical thinking skills to the experimental design process.
   This will be achieved through hands-on lab investigations and case studies.

2. Students will demonstrate introductory level scientific communication skills.
   This will be achieved through class discussions, written assignments, oral presentations, and a final poster presentation.

3. Students will demonstrate basic level information literacy.
   This will be achieved by discussing the scientific literature and analyzing data.

4. Students will learn to compassionately engage with the world.
   This will be accomplished by discussing the benefits and outcomes of science and the ethical considerations of the practice of research.

5. Students will demonstrate a working knowledge of selected core concepts in biology.
   This will be achieved through readings, discussions, quizzes, and assignments.

6. Students will demonstrate knowledge of resources and practices that will support academic success in biology.
   This will be achieved through an assignment focused on campus resources.

Course Policies:

1. Attendance and active participation are required for succeeding in this course. Attendance will be taken at the beginning of each class and latecomers will be recorded at the discretion of the instructor. Three absences will be permitted and additional absences will negatively impact your grade. Active participation involves being engaged in class discussions and group exercises, asking thoughtful questions, sharing in the responsibility of teamwork, and completing all assignments.

2. In order to be prepared for class, reading assignments must be completed before each class as specified on the course schedule. You are expected to annotate your textbook / assigned readings, take thoughtful notes, write down questions as they arise, and look up supplemental information you need to digest the material. Maintain a list of key terms and concepts discussed during the semester and it will be very helpful as you begin your academic career in biology.

3. Assignment due dates are listed on the course schedule. Assignments will be due as hardcopies in class and electronically on Bb. Assignments submitted late will be deducted 10% of the grade per day, weekends included. Problems accessing Bb and printing are not valid excuses for submitting an assignment late.

4. Six quiz dates are listed on the course schedule. An absence on a scheduled quiz date will result in an automatic zero for the quiz. Makeups will not be given, however the lowest quiz score will be dropped. Generally, quizzes will be given at the beginning of class and latecomers will not be permitted to take the quiz.

5. Maintaining communication with your instructor and group members is essential in this course. Class materials and announcements will be posted on Bb. Your *loyno* email account should be checked daily and used to communicate with your instructor and group members as needed.

6. Laptops are permitted for notetaking and course activities as indicated by your instructor. If laptops become a distraction, they will no longer be allowed.

7. Cell phones must be turned off and out of sight during class.

Disability Services: If you have a disability and wish to receive accommodations, please contact Disability Services at 504-865-2990. If you wish to receive test accommodations (e.g., extended test time), you will need to give the course instructor an official Accommodation Form from Disability Services. The Office of Disability Services is located in Marquette Hall 112.

Academic Integrity: Cheating or plagiarizing any assignment in this course will result in an automatic zero for the assignment and disciplinary meetings with Dr. Don Hauber, Chair of the Department of Biological Sciences and Dr. Maria Calzada, Dean of the College of Humanities and Natural Sciences. It is the responsibility of each student to understand Loyola's policy on academic integrity: http://2015bulletin.loyno.edu/academic-honor-code

Course Interruptions: At times, ordinary university operations are interrupted as a result of tropical storms, hurricanes, or other emergencies that require evacuation or suspension of on-campus activities. To prepare for such emergencies, all students will do the following during the first week of classes:

1. Practice signing on for each course through Bb.
2. Provide regular and alternative e-mail address and phone contact information to each instructor.

In the event of an interruption to our course due to the result of an emergency requiring an evacuation or suspension of campus activities, students will:

3. Pack textbooks, assignments, syllabi and any other needed materials for each course ad bring during an evacuation/suspension.
4. Keep up with course work during the evacuation/suspension as specified on course syllabi and on-line Blackboard courses.
5. Complete any reading and/or writing assignments given by professors before emergency began.

Assuming a power source is available:

6. Log on to university Web site within 48 hours of an evacuation/suspension.
7. Monitor the main university site (www.loyno.edu) for general information.
8. Log on to each course through Blackboard or e-mail within 48 hours of an evacuation/suspension to receive further information regarding contacting course instructors for assignments, etc.
9. Complete Blackboard and/or other online assignments posted by professors (students are required to turn in assignments on time during the evacuation/suspension period and once the university campus has reopened.)
10. Contact professors during an evacuation/suspension (or as soon as classes resume on campus) to explain any emergency circumstances that may have prevented them from completing expected work.

Further information about student responsibilities in emergencies is available on the Academic Affairs web site: http://academicaffairs.loyno.edu/students-emergency-responsibilities

Grading: Letter grades will be assigned at the end of the semester based on the total percentage of points earned. Makeup assignments / quizzes or extra credit will not be given. Points will be distributed as follows:

50pts = Participation
150pts = Assignments and Quizzes
50pts = Final Project
250pts

A: 100-90%, B: 89-80%, C: 79-70%, D: 69-60%, F: 59-0%

Participation: (50pts) Active participation and preparation are required for succeeding in this course, and as such they will account for 20% of your grade. Points for this category will be distributed as follows:

5pts: Completion of pre-course survey (details to be provided)
5pts: Completion of post-course survey (details to be provided)
10pts: Active participation (qualitatively assessed by instructor)
10pts: Attendance record (maintained by instructor)
3 absences permitted for full credit; -2pts for each additional absence
20pts: Pre-class questions submitted to Bb prior to scheduled class
0-2pts each x 10 maximum

Description of pre-class questions: Following the completion of each reading / video assignment listed on the course schedule, you are encouraged to develop **one thoughtful question** to illustrate your basic understanding of the material that will be discussed in class. Pre-class questions are due on Bb by 9PM the day before class. To submit your question, simply click on "pre-class question" in the folder for the upcoming class, click write submission, and type your question. Your total grade will be based on the first 10 questions submitted (20pts max). Your questions should demonstrate your curiosities as a budding scientist and your developing abilities to delve into a scientific idea. Your question should be succinct and written in your own words, and you should explain your rationale for posing it. It must be clear that your question is derived from the reading assignment and not simply a random pondering. You are not expected to know the answer to your question, in fact your question may be used in class to start a discussion or clarify a point. Questions will be evaluated as follows:

0pts: Not relevant to the reading / video or submitted late.
1pt: Relevant to the reading / video but low-level understanding or unclear writing.
2pts: Relevant to the reading / video with higher-level understanding and clear writing.

Sample pre-class questions:

"After reading about genetic changes in breast cancer in chapter 18, I am wondering how the levels of cell signaling molecules within a tumor affect prognosis and treatment? If cell signaling molecules could be measured directly this could be a great way to treat breast cancer."
2pts: Proper use of terms, higher-level question, rationale explained

"After reading chapter 36, how is water uptake is related to temperature?"
1pt: Low-level understanding, question is answered directly in the reading

"Following my reading of chapter 45, I am curious about the diverse functions of vertebrate hormones. For example, prolactin controls milk synthesis in mammals and water balance in fish. Assuming the structure of prolactin is very similar in mammals and fish, what other components of this pathway have changed during evolution?"
2pts: Proper use of terms, higher-level question, rationale explained

"Figure 54.12 examines microbial diversity in soil samples. How was microbial diversity measured since bacteria are too small to be counted?"
1pt: Low-level understanding, method is described directly in the reading

Assignments and Quizzes: (150pts) Independent assignments and quizzes will account for 60% of your grade in this course. Instructions for all assignments will be provided on Bb and discussed in class. Generally, hardcopies will be due in class and electronic versions must also be submitted to Bb prior to class. Assignments must follow all guidelines, be succinctly written and proofread thoroughly to receive full credit. In addition to graded assignments, there will be several ungraded assignments and exercises that will support your overall learning in the course. You are encouraged to complete these assignments with the same level of motivation. Quizzes will be given at the beginning of class or administered online through Bb. Six quizzes will be given and the lowest score will be dropped. Points for this category will be distributed as follows:

100pts: 5 and 10pt assignments (details to be provided)
50pts: 5 x 10pt quizzes

Final Project: (50pts) A final project will account for 20% of your grade in this course. Working with your team, you will propose an experiment related to arthritis, collect and analyze data, generate tables and graphs, and present your study in the form of a research poster. There will be multiple opportunities to refine your ideas and begin your study in class, however a significant portion of this assignment will be conducted outside of class. You will collaborate with your group and be responsible for completing portions of the project independently. Further details of the final project will be provided on Bb and discussed in class.

Tentative Fall 2015 Class Schedule
BioInquiry: Investigating Arthritis

	Date	Topics	Preparation for class (Check Bb for updates)	Quiz / Assignment (Check Bb for updates)
T	8/25	Course introduction	Read syllabus	
Th	8/27	Inquiring about life	Textbook: p1-9, 16-24 View: "How science works" on Bb	
T	9/1	Experimental design	Textbook: figures on p20 & 22 Article: "Arthritis at a Glance" Online: Using Graphs in Science	
Th	9/3	Unifying theme of evolution	Textbook: p10-15 View: "The Beak of the Finch"	Graphing assignment
T	9/8	Fin to limb transition "Your Inner Fish"	Textbook: 724-5 Article: "A firm step from water to land"	Quiz 1
Th	9/10	No class: Mass of the Holy Spirit	Online: Explore your inner animal	Careers assignment
T	9/15	Locomotion and natural selection	Textbook: p700-1; 1126-1130	Fish assignment
Th	9/17	Statistical analysis Computer lab: Mercy 105	Online: "Statistics in Science" View: SPSS tutorial	Quiz 2
T	9/22	Arthritis in the wild	Handout: TBA	Locomotion assignment due
Th	9/24	Gender differences in knees?	Handout: TBA Online: Virtual joint replacement	
T	9/29	Microscopic view of joint tissues	Textbook: p100-20	Anatomy assignment due
Th	10/1	Risk factors in arthritis Computer lab: Mercy Hall 105	TBA	
T	10/6	Writing about scientific literature	TBA	Bibliography due Quiz 3
Th	10/8	Scientific ethics and peer review	Article: "Scrutinizing science"	Risk factor draft due
F	10/9	No class: Friday		Campus resources assignment due
T	10/13	No class: Fall break	World Arthritis Day!	
Th	10/15	Current arthritis treatments	TBA	Final review due

T	10/20	Clinical trials of new drugs	TBA	Quiz 4
Th	10/22	Emerging targets in arthritis	TBA	
T	10/27	Gene regulation in arthritis	Textbook: p333-42; 367-72 TBA	Quiz 5
Th	10/29	Gene regulation in arthritis	TBA	
T	11/3	Developing a research proposal	TBA	Method & Results due
Th	11/5	Final project overview		Quiz 6
T	11/10	Biology Department poster tour		
Th	11/12	Pilot studies and proposal development		Poster review due
T	11/17	Proposal presentations		Proposals due
Th	11/19	Data collection & analysis		
T	11/24	Data collection & analysis		Methods due
Th	11/26	No class: Thanksgiving		
T	12/1	Poster preparation		Results due
Th	12/3	Poster preparation		
M	12/7	No class: Monday Final poster printing		Final poster due
T	12/8	Class poster session		Peer evaluations
Th	12/10	Public poster session (12:30-1:30pm)		

BioInquiry: Investigating Ecology
Biol A194; Sections 003 & 004
Fall 2015

Class meetings: Tuesdays and Thursdays
2:00-3:15PM (section 003)
3:30-4:45PM (section 004)
Location: Monroe Hall 653
Required textbook: Campbell Biology, 10th Edition by Reece, Urry, Cain, Wasserman, Minorsky, Jackson; ISBN: 9780321775658. Mastering Biology access is optional.
Supplemental readings: To be posted on Blackboard (Bb)
Additional materials: 3-ringed binder, calculator, notebook/loose leaf paper

Instructor: Dr. Aimée K. Thomas
Office: MO 560
Phone: (504) 865-2873
Email: akthomas@loyno.edu
Office hours: TR 11:00AM-12:00PM or by appointment via Email

Course Description: BioInquiry is the first course in the core biology sequence, required by all first-year biology majors. This course will engage students in the process of scientific inquiry while providing a framework for academic success at Loyola. Students will gain proficiency in experimental design, quantitative reasoning, scientific communication, and collaboration skills. Contemporary research questions will span cellular and molecular biology, physiology, organismal biology, ecology, and evolution. Each section of this course will explore a unique theme that will instill an awareness of the interdisciplinary nature of biology and its relationship to societal issues.

Investigating Ecology: This section of BioInquiry will examine how biologists learn about the natural world through the process of scientific discovery. Students will be exposed to research methods used to examine population and community ecology of organisms and learn to ask scientific questions after recognizing patterns in nature. Discussions and experiments will highlight environmental, evolutionary, and molecular factors that contribute to these patterns. Students will learn how methods such as observation, field and laboratory experimentation are used to discover new information about a specific scientific topic. Students will use SPSS statistics software to graph and analyze results of experiments. Students will also write a scientific paper and give an oral [poster] presentation of their research for each experiment.

Learning Outcomes:

1. Students will apply critical thinking skills to the experimental design process.
   This will be achieved through hands-on lab investigations and case studies.

2. Students will demonstrate introductory level scientific communication skills.
   This will be achieved through class discussions, written assignments, oral presentations, and a final poster presentation.

3. Students will demonstrate basic level information literacy.
   This will be achieved by discussing the scientific literature and analyzing data.

4. Students will learn to compassionately engage with the world.
   This will be accomplished by discussing the benefits and outcomes of science and the ethical considerations of the practice of research.

5. Students will demonstrate a working knowledge of selected core concepts in biology.
   This will be achieved through readings, discussions, quizzes, and assignments.

6. Students will demonstrate knowledge of resources and practices that will support academic success in biology.

   This will be achieved through an assignment focused on campus resources.

Course Policies:

1. Attendance and active participation are required for succeeding in this course. Attendance will be taken at the beginning of each class and latecomers will be recorded at the discretion of the instructor. Three absences will be permitted and additional absences will negatively impact your grade. Active participation involves being engaged in class discussions and group exercises, asking thoughtful questions, sharing in the responsibility of teamwork, and completing all assignments.

2. In order to be prepared for class, reading assignments must be completed before each class as specified on the course schedule. You are expected to annotate your textbook / assigned readings, take thoughtful notes, write down questions as they arise, and look up supplemental information you need to digest the material. Maintain a list of key terms and concepts discussed during the semester and it will be very helpful as you begin your academic career in biology.

3. Assignment due dates are listed on the course schedule. Assignments will be due as hardcopies in class and electronically on Bb. Assignments submitted late will be deducted 10% of the grade per day, weekends included. Problems accessing Bb and printing are not valid excuses for submitting an assignment late.

4. Four quiz dates are listed on the course schedule. An absence on a scheduled quiz date will result in an automatic zero for the quiz. Makeups will not be given. Generally, quizzes will be given at the beginning of class and latecomers will not be permitted to take the quiz.

5. Maintaining communication with your instructor and group members is essential in this course. Class materials and announcements will be posted on Bb. Your *loyno* email account should be checked daily and used to communicate with your instructor and group members as needed.

6. Laptops are permitted for note taking and course activities as indicated by your instructor. If laptops become a distraction, they will no longer be allowed.

7. Cell phones must be turned off and out of sight during class.

Disability Services: If you have a disability and wish to receive accommodations, please contact Disability Services at 504-865-2990. If you wish to receive test accommodations (e.g., extended test time), you will need to give the course instructor an official Accommodation Form from Disability Services. The Office of Disability Services is located in Marquette Hall 112.

Academic Integrity: Cheating or plagiarizing any assignment in this course will result in an automatic zero for the assignment and disciplinary meetings with Dr. Don Hauber, Chair of the Department of Biological Sciences and Dr. Maria Calzada, Dean of the College of Humanities and Natural Sciences. It is the responsibility of each student to understand Loyola's policy on academic integrity: http://2015bulletin.loyno.edu/academic-honor-code

Course Interruptions: At times, ordinary university operations are interrupted as a result of tropical storms, hurricanes, or other emergencies that require evacuation or suspension of on-campus activities. To prepare for such emergencies, all students will do the following during the first week of classes:

1. Practice signing on for each course through Bb.

2. Provide regular and alternative e-mail address and phone contact information to each instructor.

In the event of an interruption to our course due to the result of an emergency requiring an evacuation or suspension of campus activities, students will:

3. Pack textbooks, assignments, syllabi and any other needed materials for each course ad bring during an evacuation/suspension.
4. Keep up with course work during the evacuation/suspension as specified on course syllabi and on-line Blackboard courses.
5. Complete any reading and/or writing assignments given by professors before emergency began.

Assuming a power source is available:

6. Log on to university Web site within 48 hours of an evacuation/suspension.
7. Monitor the main university site (www.loyno.edu) for general information.
8. Log on to each course through Blackboard or e-mail within 48 hours of an evacuation/suspension to receive further information regarding contacting course instructors for assignments, etc.
9. Complete Blackboard and/or other online assignments posted by professors (students are required to turn in assignments on time during the evacuation/suspension period and once the university campus has reopened.)
10. Contact professors during an evacuation/suspension (or as soon as classes resume on campus) to explain any emergency circumstances that may have prevented them from completing expected work.

Further information about student responsibilities in emergencies is available on the Academic Affairs web site: http://academicaffairs.loyno.edu/students-emergency-responsibilities

Grading: Letter grades will be assigned at the end of the semester based on the total percentage of points earned. Makeup assignments / quizzes or extra credit will not be given. Points will be distributed as follows:

50pts	= Participation
150pts	= Assignments and Quizzes
50pts	= Final Project
250pts	

A: 100-90%, B: 89-80%, C: 79-70%, D: 69-60%, F: 59-0%

Participation: (50pts) Active participation and preparation are required for succeeding in this course, and as such they will account for 20% of your grade. Points for this category will be distributed as follows:

5pts:	Completion of pre-course survey (details to be provided)
5pts:	Completion of post-course survey (details to be provided)
10pts:	Active participation in class discussions (qualitatively assessed by the instructor)
10pts:	Attendance record 3 absences permitted for full credit; -2pts for each additional absence
20pts:	Pre-class questions submitted to Bb prior to scheduled class 0-2pts each x 10 maximum

Description of pre-class questions: Following the completion of each reading / video assignment listed on the course schedule, you are encouraged to develop **one thoughtful question** to illustrate your basic understanding of the material that will be discussed in class. Pre-class questions are due on Bb the day before class by 10PM. Your total grade will be based on the first 10 questions submitted (20pts max). Your questions should demonstrate your curiosities as a budding scientist and your developing abilities to dive into a scientific idea. Your question should be succinct and written in your own words, and you should explain your rationale for posing it. It must be clear that your question is derived from the reading assignment and not simply a random pondering. You are not expected to know the answer to your question, in fact your question may be used in class to start a discussion or clarify a point. Questions will be evaluated as follows:

0pts:	Not relevant to the reading / video or submitted late.
1pt:	Relevant to the reading / video but low-level understanding or unclear writing.
2pts:	Relevant to the reading / video with higher-level understanding and clear writing.

Sample pre-class questions:

"Figure 54.11 examines two communities of organisms. The question, Which forest is more diverse? is posed. Community 1 shows greater species diversity, but does that mean that the other community is not a healthy ecosystem? If diversity encompasses both richness and abundance, perhaps we should look at both independently as well to get a better understanding of the two communities."

2pts: Proper use of terms, higher-level question, rationale explained

"After reading about evolution, how does the process of evolution illuminate both the similarities and differences in organisms?"

1pt: Low-level understanding, question is answered directly in the reading

"Following my reading of the crickets and parasitic flies on the island of Kauai, Hawaii, in what situations would the silent wing mutation be favored by natural selection? I imagine that if the parasitic fly goes completely extinct on the island over the next five years that the cricket population on Kauai would evolve."

2pts: Proper use of terms, higher-level question, rationale explained

“Figure 54.12 examines microbial diversity in soil samples. How was microbial diversity measured since bacteria are too small to be counted?”

1pt: Low-level understanding, method is described directly in the reading

Assignments and Quizzes: (150pts) Independent assignments and quizzes will account for 60% of your grade in this course. Instructions for written assignments will be provided on Bb and discussed in class. Generally, hardcopies will be due in class and electronic versions must also be submitted to Bb prior to class. Assignments must follow all guidelines, be succinctly written and proofread thoroughly to receive full credit. In addition to graded assignments, there will be several ungraded assignments and exercises that will support your overall learning in the course. You are encouraged to complete these assignments with the same level of motivation. Quizzes will be given at the beginning of class or administered online through Bb. Points for this category will be distributed as follows:

100pts: 5 and 10pt assignments throughout the semester
50pts: 4 x 12.5pt quizzes

Final Project: (50pts) A final project will account for 20% of your grade in this course. Working with your team, you will propose an experiment related to plant growth, collect and analyze data, generate tables and graphs, and present your study in the form of a research poster. There will be multiple opportunities to refine your ideas and begin your study in class, however a significant portion of this assignment will be conducted outside of class. You will collaborate with your group and be responsible for completing portions of the project independently. Further details of the final project will be provided on Bb and discussed in class.

Fall 2015 Class Schedule
BioInquiry: Investigating Ecology

	Date	Topics	Read / view before class	Quiz / Assignment
T	8/25	Course introduction Creating a scientific community	Syllabus Google "Learning Communities"	SALG assessment
Th	8/27	Inquiring about life The scientific process	Textbook: p1-9, 16-24 View: "How science works"	
T	9/1	Scientific careers *Guest: Tamara Baker* Graphing	Career Development Center website	Quiz 1
Th	9/3	Unifying theme of evolution Predator avoidance in pill bugs	Textbook: p9 -15 View: "Five fingers of evolution" Ted talk Article: "Charles Darwin: A Gentle Revolutionary"	Graphing assignment due in class
T	9/8	Unifying theme of evolution Predator avoidance in pill bugs cont.		
Th	9/10	No class: Mass of the Holy Spirit Start work on SPSS posted in week 4 on Bb.		Career dialogue assignment due on Bb
T	9/15	Statistical analysis Computer lab: Monroe Hall 319	PPT: "Statistics in Science" View: SPSS tutorials	Pill bug descriptive stats and graph(s) due in class
Th	9/17	Statistical analysis Computer lab: Monroe Hall 319	PPT: "Statistics in Science" View: SPSS tutorials	Quiz 2
T	9/22	Reading primary literature		Predator avoidance assignment due on Bb
Th	9/24	Community ecology: Developing hypotheses	Textbook: p1159; 1216-1217	
T	9/29	Exploring the scientific literature *Guest: Jim Hobbs* Computer lab: Monroe Hall 319	View: There are four library tutorials posted on Bb that you should watch before class.	
Th	10/1	Writing a scientific paper: Introduction section	View: Plagiarism tutorials posted on Bb before class.	Bibliography assignment due in class
T	10/6	Community ecology: Experimental design and data collection	Textbook: p1159; 1216-1217	Quiz 3
Th	10/8	Community ecology: Data analysis	Textbook: p302 Chi square Textbook: p1216 Diversity index	Campus resources assignment due on Bb on 10/9
T	10/13	No class: Fall break		Finish data analysis

Th	10/15	Writing a scientific paper		
T	10/20	Scientific communication: Peer review process	Article: "Scrutinizing science"	Scientific Paper due in class
Th	10/22	Scientific communication: Peer review process		Oral presentation of scientific paper in class
T	10/27	Group investigation: Developing hypotheses	Textbook: p752-757; 768-770; 774-775 (*Arabidopsis* sp.)	
Th	10/29	Group investigation: Experimental design		
T	11/3	Group investigation: Experimental design and set up		Quiz 4
Th	11/5	Scientific communication: Final project overview Data collection		
T	11/10	Biology Department poster tour Compare and contrast 3 posters Data collection	Article: TBA	Poster tour assignment due at the end of class
Th	11/12	Scientific writing and peer review Data collection	Article: TBA	Methods due
T	11/17	Scientific writing and peer review Data collection	Article: TBA	Literature cited due
Th	11/19	Scientific writing and peer review Data collection & analysis		Introduction due
T	11/24	Scientific communication: Posters Data collection & analysis		
Th	11/26	No class: Thanksgiving Data collection		
T	12/1	Scientific communication: Posters Data collection & analysis		Results due
Th	12/3	Scientific communication: Posters Data collection & analysis		
M	12/7	Final poster printing		Final poster due
T	12/8	Class poster session		Peer evaluations
Th	12/10	Public poster session (12:30-1:30pm)		

Degree Program Course List (DPCL) of major requirements for students entering Loyola in 2016-17

NAME: REVISED B.S. BIOLOGICAL SCIENCES - BIOS DATE:

English Composition Placement is:
ACT ENGL score 21 or above
SAT Verbal score 501 or above
Register for ENGL-T122 ____
ACT ENGL score 20 or below
SAT Verbal score 500 or below
Register for ENGL-A100 ____

Is Math Placement Exam Required?
NO _____
YES _____
Math Placement based on test scores is:
A092 _____ (not used in final degree crs)
A117_____ A118 _____ A257 _____

LOYOLA CORE - 41 Credits

FOUNDATION COURSES Crs/Grade

First-Year Seminar T121_____ 3_____
Engl T122: Critical Reading and Writing_____ 3_____
Math A257: Calculus I _____ 4_____
Sci I: Chem A105/A107 (Gen Chem I / Lab)_____ 3/1____
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KNOWLEDGE-VALUE COURSES

Creative Arts and Cultures_____ 3_____
Hist I: T122/Emerging World *or* T124/Modern*_____ 3_____
Choice determines Hist II course below. Choose opposite periods.
Hist II_____ 3_____
**If T122 taken in ICC, take "Modern"; if T124 above, take "Emerging World"*
Phil I: Reasoning_____ 3_____
Phil II: Knowledge & Morality_____ 3_____
Rels I: Christian Theology_____ 3_____
Rels II: World Religions_____ 3_____
Sci II: (Fulfilled in Adjuncts)_____ 0_____
Social Science _____ 3_____
Writing About Literature_____ 3_____
27

LANGUAGE Placement _____
Placement Course_____ 3_____
Higher course_____ 3_____
6

Language: Choose from Spoken A100, A101, A200, A201; or Classical A100, A101, A250, A251-A499; or Cosc-A211, Cosc-A212, or Math-A271. Students are not required to take languages above the A201 level.

MAJOR.....34 Crs

BioInquiry
A101_____ 3____
Cells & Heredity - Lec
A106_____ 3____
Cells & Heredity - Lab
A107_____ 1____
Biology of Organisms - Lec
A108_____ 3____
Biology of Organisms - Lab
A109_____ 1____
Ecology & Evolution - Lec
A208_____ 3____
ETS Exam/ Exit Interview (P/F)
A491_____ 0____
14 crs

Advanced Biology Elective.....20 Crs

Course-code	Lec/Lab	Crs	Grade

Must complete at least 5 labs total

Biology electives must total 20 crs (6 crs of which may include BIOL A400, A401, A402)

All Advanced Biology Electives must be BIOLA300 or higher

ADJUNCT.....22-23 Crs

Sci II: Chem A106/A108 (Gen Chem II & Lab)_____ 3____
Organic Chem I - Lec
Chem-A300_____ 3____
Organic Chem I - Lab
Chem-A305_____ 2____
Organic Chem II - Lec
Chem-A301_____ 3____
Math-A258 (4 crs) *or*
Math-A260 (3 crs)_____ 3/4____
Phys-A115_____ 3____
Phys-A112_____ 1____
Phys-A116_____ 3____
Phys-A113_____ 1____

General Electives.....17 Crs

_____ 3____
_____ 3____
_____ 3____
_____ 3____
_____ 2____

Loyola Core.....41 crs
Languages.....6 crs
Major.....34 crs
Adjunct.....22-23 crs
General Electives.....17 crs
Total.....120-121 crs

Common Curriculum requirements are governed by the catalog year that a student is admitted.

All majors must take the ETS Biology field exam and participate in an exit interview prior to graduation, typically during the last semester in school.

GPA: Must achieve 2.0 in Major, Minor (if declared), and Loyola cumulative.

Courses used in the major cannot also be used to satisfy requirements for a minor: Non-major courses will be applied to minors as appropriate.

Degree Program Course List (DPCL) of major requirements for students entering Loyola in 2016-17

NAME: **B.S. BIOLOGICAL SCIENCES - BIOT TEACHER CERTIFICATION** **DATE:**

English Composition Placement is:	Is Math Placement Exam Required?
ACT ENGL score 21 or above	NO _____
SAT Verbal score 501 or above	YES _____
Register for ENGL-T122 ____	Math Placement based on test scores is:
ACT ENGL score 20 or below	A092 _____ (not used in final degree crs)
SAT Verbal score 500 or below	A117_____ A118 _____ A257 _____
Register for ENGL-A100 ____	

LOYOLA CORE - 41 Credits

FOUNDATION COURSES Crs/Grade

First-Year Seminar T121 _____ 3____

Engl T122: Critical Reading and Writing _____ 3____

Math A257: Calculus I_____ 4____

Sci I: Chem A105/A107 (General Chem I / Lab)_____ 3/1 ___

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KNOWLEDGE-VALUE COURSES

Creative Arts and Cultures_____ 3____

Hist I: T122/Emerging World *or* T124/Modern*_____ 3____

Choice determines Hist II course below. Choose opposite periods.

Hist II_____ 3____

**If T122 taken in ICC, take "Modern"; if T124 above, take "Emerging World"*

Phil I: Reasoning_____ 3____

Phil II: Knoweldge & Morality_____ 3____

Rels I: Christian Theology_____ 3____

Rels II: World Religions_____ 3____

Sci II: (Fulfilled in Adjuncts)_____ 0____

Social Science _TEACA100_____ 3____

Writing About Literature_____ 3____

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LANGUAGE (Take placement class only)

Placement Course 3

Language: Choice of Spoken A100, A101, A200, A201; Classical A100, A101, A250, A251-A499; or Cosc-A211, Cosc-A212, Math-A271. Language above A201 level not required.

MAJOR.....31 Crs

BioInquiry

A101_____3____

Cells & Heredity - Lec

A106_____3____

Cells & Heredity - Lab

A107_____1____

Biology of Organisms - Lec

A108_____3____

Biology of Organisms - Lab

A109_____1____

Ecology & Evolution - Lec

A208_____3____

14 Crs

Advanced Biology Electives.....17 Crs

Course-code	Lec/Lab	Crs	Grade

Must complete at least 5 labs in Biology

Biology electives must total 17 credits (6 credits of which may be BIOL A400+A401+A402)

All Advanced Biology Electives must be BIOLA300 or higher

ADJUNCT.....23-24 Crs

Sci II: Chem A106/A108 (Gen Chem II & Lab)_____3/1_____

Organic Chem I - Lec

Chem-A300_____3_____

Organic Chem I - Lab

Chem-A305_____2_____

Organic Chem II - Lec

Chem-A301_____3_____

Math-A258 (4 crs) *or*

Math-A260 (3 crs)_____3/4_____

Phys-A115_____3_____

Phys-A112_____1_____

Phys-A116_____3_____

Phys-A113 1

All majors must take the ETS Biology field exam and participate in an exit interview prior to graduation, typically during the last semester in school.

GPA: Must achieve 2.0 in Major, Minor (if declared), and Loyola cumulative.

Courses used in the major cannot also be used to satisfy requirements for a minor: Non-major courses will be applied to minors as appropriate.

TEACHER EDUCATION.....30 Crs

Multicultural Education

Teac-A100 (See Loyola Core)_____0____

Educational Psychology

Psyc-A250 _____3____

Adolescent Psychology

Psyc-A255 _____3____

Reading in the Content Area

Teac-A310 _____3____

The Learner with Special Needs

Teac-A210 _____3____

Classroom Management/Organization

Teac-A343 _____3____

Secondary Methods I (General Pedagogy)

Teac-A300 _____3____

Secondary Methods II

(Pedagogy to Specific Field)

Teac-A304 _____3____

Student Teaching

Teac-A410 _____9____

Loyola Core.....41 crs

Language.....3 crs

Major.....31 crs

Adjunct.....23-24 crs

Teacher Education.....30 crs

Total.....128-129 crs