UNIVERSITY
AT ALBANY
State University of New York

Office of the Provost & Vice President for Academic Affairs

May 15, 2014

Elizabeth L. Bringsjord
Interim Provost and Vice Chancellor
State University of New York
System Administration
State University Plaza
Albany, NY 12246

Dear Dr. Bringsjord,

On behalf of the faculty at the University at Albany, I am pleased to submit a proposal to revise our BS in Interdisciplinary Studies. By way of this proposal we seek to add a concentration in Bio-instrumentation.

This revision has been fully considered and approved through our campus governance system. Should there be a need for additional information or clarification to facilitate processing, please contact Suzanne Freed, Assistant Vice Provost for Undergraduate Education at sfreed@albany.edu.

Thank you for your consideration and assistance.

Sincerely,

Susan D. Phillips, Ph.D.
Provost and Vice President for Academic Affairs

Enclosure

c. Dr. Jeanette Altarriba, Vice Provost and Dean for Undergraduate Education
Dr. Phil Nasca, Dean, School of Public Health
Dr. Mary Gallant, Associate Dean for Academic Affairs, School of Public Health
Ms. Suzanne Freed, Asst Vice Provost for Undergraduate Education

University Hall, 308
1400 Washington Avenue, Albany, New York 12222
PH: 518-956-8030 FX: 518-956-8043
www.albany.edu

SUNY The State University of New York

Program Revision Proposal: Changes to an Existing Program

Form 3A

SUNY approval and SED registration are required for many changes to registered programs. To request a change to a registered program leading to an undergraduate degree, a graduate degree, or a certificate that does not involve the creation of a new program,1 a Chief Executive or Chief Academic Officer must submit **a signed cover letter and this completed form** to the SUNY Provost at program.review@suny.edu.

Section 1. General Information	
a) Institutional Information	1. Institution Name: **University at Albany, State University of New York** 2. Institution's 6-digit SED Institution Code: **210500** 3. Institution's Address: **1400 Washington Ave Albany, NY 12222** 4. *Additional Information: Specify each campus and its 6-digit SED Institution Code where the program is registered and where the proposed changes would apply.*
b) The Registered Program to be Changed	**1.** Program title: **Interdisciplinary Studies with a concentration in Bio-Instrumentation** 2. Award (e.g., B.A., M.S.): **Bachelor of Science (BS)** 3. Number of Required Credits: Minimum [**120**] If tracks or options, largest minimum [ ] **4.** HEGIS Code: **4901** **5.** SED Inventory of Registered Programs (IRP) 5-digit Program Code: **04653** 6. Anticipated **effective date of the change** in the program(s) (mm/dd/yyyy): **August 25, 2014** 7. If the current program(s) must remain registered until enrolled students have graduated, the anticipated effective date by which continuing students will have completed the current version of the program(s): **N/A**
c) Contact Person for This Proposal	Name and title: Suzanne K Freed Asst Vice Provost for Undergraduate Education Telephone: 518-242-6046 E-mail: sfreed@albany.edu
d) CEO (or designee) Approval	**Signature affirms that the proposal has met all applicable campus administrative and shared governance procedures for consultation, and the institution's commitment to support the program as revised.** Name and title: Susan D. Phillips, PhD. Provost and Vice President for Academic Affairs Signature and date: Susan D Phillips 5/15/14
	If the revised program will be registered jointly2 with one more other institutions, provide the following information for each partner institution. The signature confirms support of the changes.
	Partner institution's name: Name and title of partner institution's CEO: Signature of partner institution's CEO (or **append** a signed letter indicating approval of this proposal):

Version 2013-10-21

1 To propose changes that would create a new program, the Program Revision Proposal form for Creating New Program(s) from Existing Program(s) is required.

2 If the partner institution is non-degree-granting, see CEO Memo 94-04.

Section 2. Requested Changes.

Section 2.1. Changes in Program Content

a) Check all that apply. Describe each proposed change and why it is proposed.

[ ] Cumulative change from SED's last approval of the registered program of one-third or more of the minimum credits required for the award (e.g., 20 credits for associate degree programs, 40 credits for bachelor's degree programs)
[ ] Changes in a program's focus or design
[x]Adding or eliminating one or more options, concentrations or tracks
[ ] Adding or eliminating a requirement for program completion (such as an internship, clinical placement, cooperative education, or other work or field-based experience)
[ ] Altering the liberal arts and science content in a way that changes the degree classification of an undergraduate program, as defined in Section 3.47(c)(1-4) of Regents Rules

Biological research has been revolutionized in the last 15-20 years, in large part by advances in bio-instrumentation. These advances have provided the capacity to increase the scope and throughput of research activities. This expansion in scope has resulted in the development of new fields of study. For example, molecular biologists have long been interested in understanding the structure and function of genes and proteins, but due to technological limitations were restricted to studying one or at most a few genes or proteins during the course of their careers. Advances in instrumentation for techniques such as DNA sequencing, quantitative PCR, microarray analysis, 2D gel electrophoresis, and mass spectrometry now allow scientists to simultaneously study all of the genes and proteins of an organism, and have resulted in the new fields of genomics and proteomics. The continued evolution and refinement of this instrumentation now places the ability to perform such studies within the reach of most research laboratories, and thus individuals pursuing employment in technical research will likely be utilizing instrumentation of this type during their careers.

The University at Albany has made significant investments in bio-instrumentation through the creation of first the Center for Functional Genomics and then the Cancer Research Center (CRC). Core laboratories within the CRC are equipped with state-of-the-art instrumentation for molecular biology, genomics, proteomics, and cell analysis research. The laboratories include instrumentation for DNA sequencing, Next Generation sequencing, quantitative PCR, nucleic acid extraction, microarray analysis, 2D electrophoresis, mass spectrometry, flow cytometry, and laser capture microdissection. With this proposal to establish an Interdisciplinary Studies major with a **concentration in bio-instrumentation**, we can extend our use of these resources for the education of undergraduate students.

b) Provide a side-by-side comparison of all the courses in the existing and proposed revised program that clearly indicates all new or significantly revised courses, and other changes.

Bio-instrumentation is a new concentration.

Introductory Science and Math courses (38 credits)

A BIO 120	General Biology I	(3 credits)
A BIO 121	General Biology II	(3 credits)
A BIO 201	General Biology I Lab	(1 credit)

A BIO 202Z	General Biology II Lab	(1 credit)
A BIO 212Y	Introductory Genetics	(4 credits)
A BIO 217	Cell Biology	(3 credits)
A CHM 120	General Chemistry I	(3 credits)
A CHM 124	General Chemistry I Lab	(1 credit)
A CHM 121	General Chemistry II	(3 credits)
A CHM 125	General Chemistry II Lab	(1 credit)
A CHM 220	Organic Chemistry I	(3 credits)
A CHM 222	Organic Chemistry I Lab	(1 credit)
A MAT 108	Elementary Statistics	(3credits)
A MAT 112	Calculus I	(4 credits)
A PHY 140	Physics I: Mechanics	(3 credits)
A PHY 145	Physics Lab I	(1 credit)

Public Health Core Requirements (12 credits)

H SPH 201	Introduction to Public Health	(3credits)
H SPH 231	Concepts in Epidemiology	(3 credits)
H SPH 332	Introduction to Biostatistics: Collection, Analysis & Interpretation of Public Health Data	(3 credits)
H BMS 505	Biological Basis of Public Health	(3 credits)

Bio-Instrumentation Requirements (25 credits)

Bio-Instrumentation Core Courses (16 credits)

H BMS 310	Molecular and Genomic Approaches in Biotechnolgy I	(4 credits)
HBMS 311	Molecular and Genomic Approaches in Biotechnology II	(4 credits)
HMBS 312	Poteomic Methodologies in Biotechnology	(4 credits)
HBMS 314	Animal and Cell Culture Model Systems	(4 credits)

Instrumentation in Biotechnology Research Internship Courses (6 credits)

(Two from the following) Each (3 credits)

HBMS 410	Instrumentation in Biotechnology Research Internship, Molecular Core Lab
HBMS 411	Instrumentation in Biotechnology Research Internship, Proteomics Core Lab
HMBS 412	Instrumentation in Biotechnology Research Internship, Genomics Core Lab
HMBS 414	Instrumentation in Biotechnology Research Internship, Cell Analysis Lab
HBMS 415	Instrumentation in Biotechnology Research Internship, Academic Lab

Bio-Instrumentation Cooperative Training Internship (3 credits)

HBMS 420	Bio-Instrumentation Cooperative Training Internship

a) For each new or significantly revised course, **provide** a syllabus at the end of this form, and, on the ***SUNY Faculty Table*** provide the name, qualifications, and relevant experience of the faculty teaching each new or significantly revised course. NOTE: *Syllabi for all courses should be available upon request. Each syllabus should show that all work for credit is college level and of the appropriate rigor. Syllabi generally include a course description, prerequisites and corequisites, the number of lecture and/or other contact hours per week, credits allocated (consistent with SUNY policy on credit/contact hours), general course requirements, and expected student learning outcomes.*

See Appendix 1

c) What are the additional costs of the change, if any? If there are no anticipated costs, explain why.

The University at Albany has made significant investments in bio-instrumentation through the creation of first the Center for Functional Genomics and then the Cancer Research Center (CRC). Core laboratories within the CRC are equipped with state-of-the-art instrumentation for molecular biology, genomics, proteomics, and cell analysis research. The laboratories include instrumentation for DNA sequencing, Next Generation sequencing, quantitative PCR, nucleic acid extraction, microarray analysis, 2D electrophoresis, mass spectrometry, flow cytometry, and laser capture microdissection. With this proposal to establish an undergraduate degree program in bio-instrumentation, we seek to maximize the University's investment in this research instrumentation by using these resources for the education of undergraduate students. Existing personnel resources within the School of Public Health and the Cancer Research Center are sufficient to meet the needs required by our current student projections, for administration, advising and instruction.

Section 2.2. Other Changes

Check all that apply. Describe each proposed change and why it is proposed.

[ ] Program title
[ ] Program award
[ ] Mode of delivery
NOTES: *(1) If the change in delivery enables students to complete 50% of more of the program via distance education, submit a Distance Education Format Proposal* as part of this proposal. *(2) If the change involves adding an accelerated version of the program that impacts financial aid eligibility or licensure qualification, SED may register the version as a separate program.*
[ ] Format change(s) (e.g., from full-time to part-time), based on SED definitions, for the **entire** program
1) State proposed format(s) and consider the consequences for financial aid
2) Describe availability of courses and any change in faculty, resources, or support services.
[ ] A change in the total number of credits in a certificate or advanced certificate program
[ ] Any change to a registered licensure-qualifying program, or the addition of licensure qualification to an existing program. **Exception:** Small changes in the required number of credits in a licensure-qualifying program that <u>do not involve</u> a course or courses that satisfy one of the required content areas in the profession.

Section 3. Sample Program Schedule

a) For **<u>undergraduate programs</u>**, complete the ***SUNY Undergraduate Sample Program Schedule*** to show the sequencing and scheduling of courses in the program. If the program has separate tracks or concentrations, complete a ***Sample Program Schedule*** for each one.

NOTE: *The* ***Undergraduate Schedule*** *must show* ***all curricular requirements*** *and demonstrate that the program conforms to SUNY's and SED's policies.*

- *It must show how a student can complete all program requirements within SUNY credit limits, unless a longer period is selected as a format in Item 2.1(c): two years of full-time study (or the equivalent) and 64 credits for an associate degree, or four years of full-time study (or the equivalent) and 126 credits for a bachelor's degree. Bachelor's degree programs should have at least 45 credits of upper division study, with 24 in the major.*
- *It must show how students in A.A., A.S. and bachelor's programs can complete, within the first two years of full-time study (or 60 credits), no fewer than 30 credits in approved SUNY GER courses, with at least 3 credits each in Basic Communication and Mathematics, plus no fewer than three credits each in at least 5 of the following 8 categories: Natural Science, Social Science, American History, Western Civilization, Other World Civilizations, Humanities, the Arts and Foreign Languages.*
- *It must show how students can complete Liberal Arts and Sciences (LAS) credits appropriate for the degree.*
- *When a SUNY Transfer Path applies to the program, it must show how students can complete an appropriate number of SUNY Transfer Path (TPath) courses (from the Transfer Path Requirement Summary) within the first two years of full-time study (or 60 credits), consistent with SUNY's Student Seamless Transfer policy.*
- *Requests for a program-level waiver of SUNY credit limits, SUNY GER and/or a SUNY Transfer Path require the campus to submit a Waiver Request – a different form – with compelling justification(s).*

See Appendix 2; could not format to fit page.

Section 4. SUNY Faculty Table

a) If applicable, provide information on faculty members who will be teaching new or significantly revised courses in the program. Expand the table as needed.

b) Append at the end of this document position descriptions or announcements for each to-be-hired faculty member

(a)	(b)	(c)	(d)	(e)	(f)
Faculty Member Name and Title and/or Rank at the Institution (Include and identify Program Director.)	**% of Time Dedicated to This Program**	**Program Courses Which May Be Taught (Number and Title)**	**Highest and Other Applicable Earned Degrees (include College or University)**	**Discipline(s) of Highest and Other Applicable Earned Degrees**	**Additional Qualifications: List related certifications and licenses and professional experience in field.**
PART 1. Full-Time Faculty					
Program Director: John Tine Director, Molecular Genetics Laboratory, UAlbany Cancer Research Center Adjunct Assistant Professor, Department of Biological Sciences UAlbany	60%	BMS 310 - Molecular and Genomic Approaches in Biotechnology I BMS 410 - Instrumentation in Biotechnology Research Internship, Molecular Core Lab	Ph.D., Albany Medical College, 1989 B.S., Siena College, 1982	Microbiology and Immunology Biology	Part-time Instructor, Microbiology, Hudson Valley Community College (2009-present)

(a)	(b)	(c)	(d)	(e)	(f)
Faculty Member Name and Title and/or Rank at the Institution (Include and identify Program Director.)	**% of Time Dedicated to This Program**	**Program Courses Which May Be Taught (Number and Title)**	**Highest and Other Applicable Earned Degrees (include College or University)**	**Discipline(s) of Highest and Other Applicable Earned Degrees**	**Additional Qualifications: List related certifications and licenses and professional experience in field.**
Sridar Chittur Director, High-Throughput Genomics Laboratory, UAlbany Cancer research Center Research Associate Professor, Department of Biomedical Sciences, UAlbany SPH	40%	BMS 311 - Molecular and Genomic Approaches in Biotechnology II BMS 412 - Instrumentation in Biotechnology Research Internship, Genomics Core Lab	Ph.D., School of Pharmacy, West Virginia University, 1996 B.Pharm, The Bombay College of Pharmacy, University of Bombay, 1991	Medicinal Chemistry Pharmacy	Adjunct Assistant Professor, Center for Cell Biology & Cancer Research, Albany Medical College (2010-present) PostDoc, Purdue University, School of Pharmacal Sciences (2002)
Qishan Lin Director, Proteomics Facility, UAlbany Cancer Research Center Research Associate Professor, Department of Biomedical Sciences, UAlbany SPH	40%	BMS 312 - Proteomic Methodologies in Biotechnology BMS 411 - Instrumentation in Biotechnology Research Internship, Proteomics Core Lab	Ph.D., Institute of Chemistry, Chinese Academy of Sciences, 1996 M.Sc., Institute of Photographic Chemistry, Chinese Academy of Sciences, 1991 B.Sc., National University of Defense & Technology, China, 1988	Analytical Chemistry Organic Chemistry Chemistry	PostDoc, University of Washington, Howard Hughes Medical Institute (2000) PostDoc, Albany Medical College (2002)
Brian Parr Director, Transgenic Mouse/ Cell Culture/Laser Capture Microdissection Facilities, UAlbany Cancer Research Center Research Associate Professor, Department of Biomedical Sciences, UAlbany SPH	40%	BMS 314 – Animal and Cell Culture Model Systems BMS 414 - Instrumentation in Biotechnology Research Internship, Cell Analysis Core Lab	Ph.D., Cornell University, 1986 M.S., University of Virginia, 1980 B.A., Haverford College, 1977	History of Evolutionary Biology Physiology	Director, University of Colorado Cancer Center, Transgenic/ Knockout Core Facility (2004-2007) Assistant Professor, University of Colorado, Boulder (1995-2003)

(a)	(b)	(c)	(d)	(e)	(f)
Faculty Member Name and Title and/or Rank at the Institution (Include and identify Program Director.)	**% of Time Dedicated to This Program**	**Program Courses Which May Be Taught (Number and Title)**	**Highest and Other Applicable Earned Degrees (include College or University)**	**Discipline(s) of Highest and Other Applicable Earned Degrees**	**Additional Qualifications: List related certifications and licenses and professional experience in field.**
Martin Tenniswood Director, Cancer Research Center Professor, Department of Biomedical Sciences	20%	BMS 415 - Instrumentation in Biotechnology Research Internship, Academic Lab BMS 420 - Bio-Instrumentation Cooperative Training Internship BMS 505 – Biological Basis of Public Health	Ph.D., Queen's University, Canada, 1979 B.Sc., Trent University, Canada, 1973	Biochemistry Chemistry	Director, Center for Functional Genomics (2009-present) Director, Molecular Biology Core Facility, Adirondack Biomedical Research Institute (1994-1998)
JoEllen Welsh Professor, Department of Environmental Health Sciences	15%	BMS 415 - Instrumentation in Biotechnology Research Internship, Academic Lab BMS 420 - Bio-Instrumentation Cooperative Training Internship	Ph.D., Cornell University, 1980 B.A., Rutgers University, 1975	Nutritional Biochemistry Biology	PostDoc, University of Ottawa, Canada, (1983-1985) Director, Flow Cytometry and Sorting Facility, University of Notre Dame
Douglas Conklin Associate Professor, Department of Biomedical Sciences	15%	BMS 415 - Instrumentation in Biotechnology Research Internship, Academic Lab BMS 420 - Bio-Instrumentation Cooperative Training Internship	Ph.D., University of Wisconsin-Madison, 1992 B.S., University of Pittsburgh, 1985	Molecular Biology Microbiology	Co-Inventor, siRNAs PostDoc, Cold Spring Harbor Laboratory, (1993-1997)

(a)	(b)	(c)	(d)	(e)	(f)
Faculty Member Name and Title and/or Rank at the Institution (Include and identify Program Director.)	**% of Time Dedicated to This Program**	**Program Courses Which May Be Taught (Number and Title)**	**Highest and Other Applicable Earned Degrees (include College or University)**	**Discipline(s) of Highest and Other Applicable Earned Degrees**	**Additional Qualifications: List related certifications and licenses and professional experience in field.**
Jason Herschkowitz Assistant Professor, Department of Biomedical Sciences	15%	BMS 415 - Instrumentation in Biotechnology Research Internship, Academic Lab BMS 420 - Bio-Instrumentation Cooperative Training Internship	Ph.D., University of North Carolina, 2008 M.F.S., George Washington University, 2000 B.S., SUNY Buffalo, 1998	Genetics & Molecular Biology Forensic Science Medical Technology	PostDoc, Baylor College of Medicine, (2008-2013)
Ramune Reliene Assistant Professor, Department of Environmental Health Sciences	15%	BMS 415 - Instrumentation in Biotechnology Research Internship, Academic Lab BMS 420 - Bio-Instrumentation Cooperative Training Internship	Ph.D., Swiss Federal Institute of Technology, 2001 M.S., University of Vilnius, 1996 B.S., University of Vilnius, 1994	Biochemistry Biochemistry Biochemistry	PostDoc, University of California Los Angeles, (2001-2005) PostDoc, Lymphoma Research Foundation (2005-2007)
Dwight Williams Clinical Professor, Department of Health Policy, Management, & Behavior Director, Undergraduate Public Health Program, School of Public Health	20%	SPH 201 – Intro to Public Health	M.S.W., Rutgers University, 1971	Social Work	Director, Northeast Regional Public Health Leadership Institute (NEPHLI), NYS Department of Health (1996-2012) Chief Health Planner, Bureau of Health Facility Planning, NYS Department of Health (1985-1996) Health Executive Development Program Cornell University (1985)
Elizabeth Vasquez Assistant Professor, Department of Epidemiology and Biostatistics	10%	SPH/EPI 231 – Concepts in Epidemiology	Dr.P.H., New York Medical College, 2010 M.P.H., Columbia University, 2002	Epidemiology Epidemiology	Research Scientist, Helen Hayes Hospital, West Haverstraw, NY (2002-2010)

(a)	(b)	(c)	(d)	(e)	(f)
Faculty Member Name and Title and/or Rank at the Institution (Include and identify Program Director.)	**% of Time Dedicated to This Program**	**Program Courses Which May Be Taught (Number and Title)**	**Highest and Other Applicable Earned Degrees (include College or University)**	**Discipline(s) of Highest and Other Applicable Earned Degrees**	**Additional Qualifications: List related certifications and licenses and professional experience in field.**
Igor Kuznetsov Associate Professor, Gen*NY*sis Center for Excellence in Cancer Genomics and Department of Epidemiology and Biostatistics	10%	SPH/EPI 332 – Introduction to Biostatistics	Ph.D., Mount Sinai School of Medicine, New York University, 2003 M.Phil., Mount Sinai School of Medicine, New York University, 2001 M.S. equiv., Novosibirsk State University, Russia, 1992	Biomathematics Biomathematics Cell Biology and Genetics	PostDoc, Mount Sinai School of Medicine, New York University, (2003) Research Associate, Dept of Molecular Biosciences, University of Kansas (2003-2004)
Part 2. Part-Time Faculty					
Anju Menon	5%	SPH/EPI 332 – Introduction to Biostatistics	M.S., University of Louisiana at Lafayette, 2010 M.S., University of Connecticut, 2008	Mathematics Statistics	PhD student in Biostatistics (2010 – present) Statistical Programmer, NYS Department of Health (2011)
Part 3. To-Be-Hired Faculty (List as TBH1, TBH2, etc., and provide expected hiring date instead of name.)					

University at Albany
Program Revision – Interdisciplinary Studies

Appendix 1

Syllabi for new classes

Molecular and Genomic Approaches in Biotechnology I
BMS 310, Fall 2014
Syllabus

Location and Meeting Times:
Lecture: Tu/Th 10:30am – 11:50am, TBD (tentative Massry Conference Center)
Laboratory: We 9:00am – 12:00pm, CRC 211

Course Director:

John Tine, Ph.D.
School of Public Health
University at Albany, SUNY
Cancer Research Center, 1 Discovery Drive
Tel: 518-591-7212
Office: CRC 342C, hours TBD
jtine@albany.edu

Teaching Assistant: TBD

Course Description:

This course is the first of a two course sequence. The goal of this course is to provide students with a solid theoretical background in molecular biological and advanced genomic technologies, hands on experience in the performance of many of these techniques and an understanding of the instrumentation required to perform them, and an appreciation for how these technological tools can be applied to address research questions in the life sciences. The course will begin with an overview of basic molecular biology techniques such as purification, enzymatic manipulation, and separation of nucleic acids, PCR, and hybridization. The course will then focus on more advanced technologies such as DNA sequencing and quantitative PCR and the instrumentation required to perform these technologies. Applications of the technologies will be highlighted, including sequencing, gene expression analysis, genotyping, epigenetic studies, etc.

The lecture topics will be partnered with laboratory exercises that provide hands-on experience so that students develop a more full understanding of these technologies. A focus will be on the instrumentation required to perform the various technologies. While instrument operation and data analysis will be highlighted, there will be significant coverage of other key issues such as instrument design, maintenance, quality control calibrations, and troubleshooting.

Prerequisites:

A BIO 212Y Introductory Genetics, or equivalent from another institution
A BIO 217 Cell Biology, or equivalent from another institution

Course Learning Objectives:

1. Students will demonstrate an understanding of basic molecular biology techniques in both theory and performance.

2. Students will develop and demonstrate a thorough understanding of DNA sequencing, the instrumentation required for its performance, and the analysis of DNA sequence data.

3. Students will demonstrate an ability to generate DNA sequence by performing reactions and operating the instrumentation necessary to obtain this data.

4. Students will demonstrate analyze and troubleshoot the quality of DNA sequence by use of software tools for data analysis.

5. Students will develop and demonstrate a thorough understanding of quantitative PCR, the instrumentation required for its performance, the analysis of qPCR data, and the applications that are facilitated by this technology.

6. Students will demonstrate an ability to generate qPCR data by performing reactions and operating the instrumentation necessary to obtain this data.

7. Students will demonstrate an ability to analyze qPCR data by use of software tools for data analysis.

8. Students will demonstrate an understanding and utilization of appropriate laboratory safety procedures.

Reading Materials:

There is no assigned textbook for the course. Reading materials will be assigned by the course instructor and posted on the course Blackboard site as appropriate. These readings will be derived from the current scientific literature, and may change to reflect technological advances. All readings will be available for student access prior to the appropriate lecture or laboratory session.

Grading:

Lecture: Three tests will be administered to assess students comprehension of material covered in lecture. The tests can contain a mixture of both objective (multiple choice, true-false) and short essay questions. The lecture grade will be an average of the test grades

Laboratory: To assess performance in the laboratory component of the course, 2-3 lab reports will be assigned. The laboratory grade will be an average of the lab report grades.

Final grade: The lecture grade will comprise 75%, and the laboratory grade 25%, of the final course grade.

The grading scale for the course is follows:

A = 93-100	A- = 90-92	
B+ = 87-89	B = 83-88	B- = 80-82
C+ = 77-79	C = 73-78	C- = 70-72
D+ = 67-69	D = 63-68	D- = 60-62
E = 0-59		

Class Policies:

Attendance: Regular attendance is necessary for academic achievement in this course. The instructor should be notified promptly in case of absence, with a valid reason provided. For absences related to medical issues, please refer to the University's Medical Excuse Policy (www.albany.edu/health_center/medicalexcuse.shtml). If absent from lecture, the student is responsible for all material covered during that session. If absent from laboratory, the student will be provided with an alternative exercise that will need to be completed. More than three unexcused absences in lecture or laboratory will result in a 5% reduction of the lecture or laboratory component of the final course grade.

Safety: Students are required to adhere to the University's laboratory safety guidelines during laboratory sessions. These guidelines will be reviewed during the first laboratory session.

Electronics: As a courtesy to your fellow students and faculty, the active use of cell phones (including text messaging) is not allowed during class time.

Academic Integrity:

Students are expected to adhere to university policies on academic integrity (see http://www.albany.edu/undergraduate_bulletin/regulations.html). Any form of academic dishonesty, including cheating or plagiarism, will not be tolerated and will lead to disciplinary action as deemed appropriate by the faculty and/or the University's judicial process.

From the University's Standards of Academic Integrity Policy, Fall 2013:
"Every student has the responsibility to become familiar with the standards of academic integrity at the University. Faculty members must specify in their syllabi information about academic integrity, and may refer students to this policy for more information. Nonetheless, student claims of ignorance, unintentional error, or personal or academic pressures cannot be excuses for violation of academic integrity. Students are responsible for familiarizing themselves with the standards and behaving accordingly, and UAlbany faculty are responsible for teaching, modeling and upholding them. Anything less undermines the worth and value of our intellectual work, and the reputation and credibility of the University at Albany degree."

Course Schedule:

Lecture: The material to be covered during the course lectures is arranged into topics. The coverage of topics will be spread over multiple lecture sessions (80 minutes each, approximately 26 sessions total). The lecture topics to be covered during the course are shown in the table below.

Laboratory: The laboratory component of this course is designed to complement the schedule of lecture topics. There will be one laboratory session per week (3 hours each, approximately 13 sessions total). Activities for some topics will be spread over multiple laboratory sessions. The laboratory topics to be covered during the course are shown in the table below.

Lecture/Laboratory Schedule:

Week	**Day**	**Topic**
Week 1	Tue	Course introduction, Nucleic acid purification
	Thurs	Enzymatic manipulation of nucleic acids I
	Lab (Wed)	*Laboratory safety*
Week 2	Tue	Enzymatic manipulation of nucleic acids II
	Thurs	Polymerase chain reaction I
	Lab (Wed)	*Nucleic acid purification, Enzymes I*
Week 3	Tue	Polymerase chain reaction II, Nucleic acid hybridization
	Thurs	DNA sequencing - overview
	Lab (Wed)	*Enzymes II, PCR*
Week 4	Tue	Test 1
	Thurs	DNA sequencing - chemistries
	Lab (Wed)	*PCR-RFLP analysis*
Week 5	Tue	DNA sequencing – design considerations
	Thurs	DNA sequencing – separation/detection
	Lab (Wed)	*DNA sequencing I: instrumentation overview*
Week 6	Tue	DNA sequencing instruments
	Thurs	DNA sequencing – data analysis/troubleshooting
	Lab (Wed)	*DNA sequencing II: reactions*
Week 7	Tue	DNA sequence analysis software I
	Thurs	DNA sequence analysis software II
	Lab (Wed)	*DNA sequencing III: run, maintenance considerations*
Week 8	Tue	DNA sequencing strategies
	Thurs	Quantitative PCR – overview of technology
	Lab (Wed)	*DNA sequencing IV: data analysis/ troubleshooting/apps*
Week 9	Tue	Test 2
	Thurs	qPCR – assay design

	Lab (Wed)	*qPCR I: instrumentation overview*
Week 10	Tue	qPCR – experimental considerations and design
	Thurs	qPCR – instrumentation
	Lab (Wed)	*qPCR II: assay/experimental design*
Week 11	Tue	qPCR – data analysis, software
	Thurs	qPCR – applications I
	Lab (Wed)	*qPCR III: templates/reactions*
Week 12	Tue	qPCR – applications II
	Thurs	qPCR – applications III
	Lab (Wed)	*qPCR IV: instrument set-up/run/maintenance considerations*
Week 13	Tue	Automation in qPCR
	Thurs	qPCR quality control
	Lab (Wed)	*qPCR V: applications*
Week 14	Tue	Review
	Thurs	Test 3
	Lab (Wed)	*Open*

Molecular and Genomic Approaches in Biotechnology II
BMS 311, Spring 2015

Location and meeting times:
Lecture: T/Th 1:00pm -2:20 pm, TBD (tentative Massry Conference Center)
Laboratory: W 1:00pm – 4:00pm, CRC 211

Course Director:

Sridar V. Chittur PhD
Department of Biomedical Sciences
Director, Microarray & HT Sequencing Core
Center for Functional Genomics, SUNY Albany
One Discovery Dr, CRC342G, hours TBD
Rensselaer, NY 12144
Tel:518-591-7215
schittur@albany.edu

Teaching Assistant: TBD

Course Description

This course is the second of a two course sequence. The goal of this course is to provide students with a solid theoretical background in advanced genomic technologies, hands on experience in the performance of many of these techniques and an understanding of the instrumentation required to perform them, and an appreciation for how these technological tools can be applied to address research questions in the life sciences. The main focus of the course will be on advanced genomic technologies such as digital PCR, microarray analysis, Next Generation Sequencing and the instrumentation required to apply these technologies. Applications of the technologies will be highlighted, including gene expression and copy number analysis, genotyping, epigenetic studies, study of DNA binding proteins, etc.

The lecture topics will be partnered with laboratory exercises that provide hands-on experience so that students develop a more full understanding of these technologies. A focus will be on the instrumentation required to perform the various technologies. While instrument operation and data analysis will be highlighted, there will be significant coverage of other key issues such as instrument design, maintenance, quality control calibrations, and troubleshooting.

Prerequisites

BMS 310, Molecular and Genomic Approaches in Biotechnology I

Student Objectives

1. Students will develop and demonstrate a thorough understanding of digital PCR, the instrumentation required for its performance, the analysis of digital PCR data, and the applications that are facilitated by this technology.

2. Students will develop and demonstrate a thorough understanding of microarray analysis, the instrumentation required for its performance, the analysis of microarray data, and the applications that are facilitated by this technology.
3. Students will demonstrate an ability to generate and analyze microarray data by performing target preparation, operating instrumentation, and performing data analysis.
4. Students will be able to describe the application of various microarrays in clinical settings.
5. Students will develop and demonstrate a thorough understanding of Next Generation Sequencing approaches and the applications that are facilitated by these approaches.
6. Students will be able to utilize high throughput genomic data and perform pathway analysis.
7. Students will learn about emerging nucleic acid technologies and how they can be applied to diagnostics.
8. Students will demonstrate an understanding and utilization of appropriate laboratory safety procedures.

Reading Materials:

There is no assigned textbook for the course. Reading materials will be assigned by the course instructor and posted on the course Blackboard site as appropriate. These readings will be derived from the current scientific literature, and may change to reflect technological advances. All readings will be available for student access prior to the appropriate lecture or laboratory session.

Grading

Lecture: Three tests will be administered to assess students comprehension of material covered in lecture. The tests can contain a mixture of both objective (multiple choice, true-false) and short essay questions. The lecture grade will be an average of the test grades

Laboratory: To assess performance in the laboratory component of the course, 2-3 lab reports will be assigned. The laboratory grade will be an average of the lab report grades.

Final grade: The lecture grade will comprise 75%, and the laboratory grade 25%, of the final course grade.

The grading scale for the course is follows:

A = 93-100	A- = 90-92	
B+ = 87-89	B = 83-88	B- = 80-82
C+ = 77-79	C = 73-78	C- = 70-72
D+ = 67-69	D = 63-68	D- = 60-62
E = 0-59		

Class Policies:

Attendance: Regular attendance is necessary for academic achievement in this course. The instructor should be notified promptly in case of absence, with a valid reason provided. For absences related to medical issues, please refer to the University's Medical Excuse Policy (www.albany.edu/health_center/medicalexcuse.shtml). If absent from lecture, the student is responsible for all material covered during that session. If absent from laboratory, the student will be provided with an alternative exercise that will need to be completed. More than three unexcused absences in lecture or laboratory will result in a 5% reduction of the lecture or laboratory component of the final course grade.

Safety: Students are required to adhere to the University's laboratory safety guidelines during laboratory sessions. These guidelines will be reviewed during the first laboratory session.

Electronics: As a courtesy to your fellow students and faculty, the active use of cell phones (including text messaging) is not allowed during class time.

Academic Integrity:

Students are expected to adhere to university policies on academic integrity (see http://www.albany.edu/undergraduate_bulletin/regulations.html). Any form of academic dishonesty, including cheating or plagiarism, will not be tolerated and will lead to disciplinary action as deemed appropriate by the faculty and/or the University's judicial process.

From the University's Standards of Academic Integrity Policy, Fall 2013:
"Every student has the responsibility to become familiar with the standards of academic integrity at the University. Faculty members must specify in their syllabi information about academic integrity, and may refer students to this policy for more information. Nonetheless, student claims of ignorance, unintentional error, or personal or academic pressures cannot be excuses for violation of academic integrity. Students are responsible for familiarizing themselves with the standards and behaving accordingly, and UAlbany faculty are responsible for teaching, modeling and upholding them. Anything less undermines the worth and value of our intellectual work, and the reputation and credibility of the University at Albany degree."

Course Schedule:

Lecture: The material to be covered during the course lectures is arranged into topics. The coverage of topics will be spread over multiple lecture sessions (80 minutes each, approximately 26 sessions total). The lecture topics to be covered during the course are shown in the table below.

Laboratory: The laboratory component of this course is designed to complement the schedule of lecture topics. There will be one laboratory session per week (3 hours each, approximately 13 sessions total). Activities for some topics will be spread over

multiple laboratory sessions. The laboratory topics to be covered during the course are shown in the table below.

Lecture/Laboratory Schedule:

Week	**Day**	**Topic**
Week 1	Tue	Course introduction, Digital PCR overview
	Thurs	Digital PCR – assay and experimental design
	Lab (Wed)	*Laboratory safety*
Week 2	Tue	Digital PCR – instrumentation
	Thurs	Digital PCR – applications
	Lab (Wed)	*Digital PCR, instrumentation, run*
Week 3	Tue	Microarray – overview
	Thurs	Microarray approaches I
	Lab (Wed)	*Digital PCR data analysis*
Week 4	Tue	Microarray approaches II
	Thurs	Test
	Lab (Wed)	*Microarray template preparation*
Week 5	Tue	Microarray experimental design
	Thurs	Microarray methods I
	Lab (Wed)	*Microarray hybridization*
Week 6	Tue	Microarray methods II
	Thurs	Instrumentation for microarray analysis I
	Lab (Wed)	*Microarray scan*
Week 7	Tue	Instrumentation for microarray analysis II
	Thurs	Microarray data extraction and analysis
	Lab (Wed)	*Microarray data extraction, analysis*
Week 8	Tue	Microarray downstream data analysis I
	Thurs	Microarray downstream data analysis II
	Lab (Wed)	*Microarray downstream analysis I*
Week 9	Tue	Microarray applications I
	Thurs	Microarray applications II
	Lab (Wed)	*Microarray downstream analysis II*
Week 10	Tue	Microarray applications III
	Thurs	Microarray quality control
	Lab (Wed)	*Next Gen sequencing: instrumentation overview*
Week 11	Tue	Test 2
	Thurs	Next Generation sequencing technology
	Lab (Wed)	*Next Gen sequencing: template preparation/run*
Week 12	Tue	Next Generation sequencing approaches
	Thurs	Next Generation sequencing methods
	Lab (Wed)	*Next Gen sequencing: data analysis*
Week 13	Tue	Next Generation sequencing data analysis
	Thurs	Next Generation sequencing applications I
	Lab (Wed)	*Next Gen sequencing: applications*

Week 14	Tue	Next Generation sequencing applications II
	Thurs	Final Exam
	Lab (Wed)	*Open*

Proteomic Methodologies in Biotechnology
BMS 312, Fall 2014
Syllabus

Lecture will be held on Tuesday and Thursday from 1:00pm – 2:20pm, TBD (tentative Massy Conference Center)
Laboratory will be held on Friday from 1:00 – 4:00 pm, CRC 218

Course Director:

Qishan Lin, PhD
Department of Biomedical Sciences
School of Public Health
University at Albany, SUNY
Tel: (518)591-7214
qlin@albany.edu

Office hours: TBD

Teaching assistant: TBD

Course Description

The use of mass spectrometry in biomedical sciences has become increasingly important as applications of the huge contribution from sequencing of human and other genomes continue to impact research. The goal of this course is to provide students with a solid theoretical background in advanced proteomics/mass spectrometry technologies, hands on experience in the performance of many of these techniques and an understanding of the instrumentation required to perform them, and an appreciation for how these technological tools can be applied to address research questions in the life sciences. The undergraduate students learn about this cutting edge technology and gain new skills that we believe will help them with their future scientific careers. The course will begin with a brief review of basic analytical techniques such as SDS-PAGE, chromatography and mass spectrometry. The main focus of the course will be on such technologies as 2D gel electrophoresis, high pressure liquid chromatography, mass spectrometry and the instrumentation required to apply these technologies. Applications of the technologies will be highlighted, including small molecular analysis, peptide and protein sequencing, protein expression analysis, protein post-translational modifications, etc. The lecture topics will be partnered with laboratory exercises that provide hands-on experience so that students develop a more full understanding of these technologies. A focus will be on the instrumentation required to perform the various technologies. While instrument operation and data analysis will be highlighted, there will be significant

coverage of other key issues such as instrument design, maintenance, quality control calibrations, and troubleshooting.

Prerequisites:
A CHM 120 General Chemistry I, or equivalent from another institution
A BIO 217 Cell Biology, or equivalent from another institution

Learning objectives

- You will be able to demonstrate additional depth of knowledge in systems biology and proteomics.
- You will be able to critically evaluate the work of their peers in biomedical sciences and will be able to identify the strengths and limitations of various laboratory methodologies.
- You will be able to describe the role of proteomics in biomedical sciences
- You will learn to understand and communicate basic proteomics/mass spec terminologies.
- You will learn about emerging proteomics technologies and how they can be applied to diagnosis and prevention of human disease.
- You will learn where to locate and how to acquire accurate and practical biological information that impacts human health issues.
- You will be able to explain the use of laboratory procedures for understanding and diagnosing selected diseases and conditions.
- You will be able to understand the technologies used in the existing and proposed programs in newborn, carrier, and cancer screening, and discuss pros and cons of each program, including medical, economic, ethical, legal, social and political factors.

Reading Materials

There is no assigned textbook for the course. Reading materials will be assigned by the course instructor and posted on the course Blackboard site as appropriate. These readings will be derived from the current scientific literature, and may change to reflect technological advances. All readings will be available for student access prior to the appropriate lecture or laboratory session.

Grading Scale:

The course will contain two lecture exams; the first is on the basic techniques of proteomics and mass spectrometry and will serve as a mid-term exam; the second will be comprehensive to help participants integrate the concepts being presented in the course, and be considered a final exam. Performance assessments of laboratory exercises will also be obtained in the form of 2-3 lab reports.

For determining the final grade, 25% will consist of the mid-term exam grade, 50% will consist of the final exam grade, and 25% will consist of the average of laboratory assessments.

A = 93-100	A- = 90-92	
B+ = 87-89	B = 83-88	B- = 80-82
C+ = 77-79	C = 73-78	C- = 70-72
D+ = 67-69	D = 63-68	D- = 60-62
E = 0-59		

Note 1: The "earned" grad of "E" is treated mathematically as a "30".

Note 2: Plagiarism without proper citation from any and all sources will result in a grade of "E" for the course. Consult the Graduate Student Bulletins or the course Instructors if you have any questions.

Attendance Policy

Attendance: Regular attendance is necessary for academic achievement in this course. The instructor should be notified promptly in case of absence, with a valid reason provided. For absences related to medical issues, please refer to the University's Medical Excuse Policy (www.albany.edu/health_center/medicalexcuse.shtml). If absent from lecture, the student is responsible for all material covered during that session. If absent from laboratory, the student will be provided with an alternative exercise that will need to be completed. More than three unexcused absences in lecture or laboratory will result in a 5% reduction of the lecture or laboratory component of the final course grade.

Safety: Students are required to adhere to the University's laboratory safety guidelines during laboratory sessions. These guidelines will be reviewed during the first laboratory session.

Policy on Academic Integrity

Students are expected to adhere to university policies on academic integrity (see http://www.albany.edu/undergraduate_bulletin/regulations.html). Any form of academic dishonesty, including cheating or plagiarism, will

not be tolerated and will lead to disciplinary action as deemed appropriate by the faculty and/or the University's judicial process.

From the University's Standards of Academic Integrity Policy, Fall 2013:
"Every student has the responsibility to become familiar with the standards of academic integrity at the University. Faculty members must specify in their syllabi information about academic integrity, and may refer students to this policy for more information. Nonetheless, student claims of ignorance, unintentional error, or personal or academic pressures cannot be excuses for violation of academic integrity. Students are responsible for familiarizing themselves with the standards and behaving accordingly, and UAlbany faculty are responsible for teaching, modeling and upholding them. Anything less undermines the worth and value of our intellectual work, and the reputation and credibility of the University at Albany degree."

Class Schedule:

Week 1	Section 1 (Tue)	Introduction
	Section 2 (Thurs)	Review of basic analytical chemistry techniques
	Section 3 (Fri)	Lab safety
Week 2	Section 1 (Tue)	Liquid chromatography
	Section 2 (Thurs)	column-based chromatography
	Section 3 (Fri)	To be determined
Week 3	Section 1 (Tue)	Electrophoresis 1
	Section 2 (Thurs)	Electrophoresis 2
	Section 3 (Fri)	1D SDS-PAGE 1
Week 4	Section 1 (Tue)	2D gel electrophoresis 1
	Section 2 (Thurs)	2D gel electrophoresis 2
	Section 3 (Fri)	1D SDS-PAGE 2
Week 5	Section 1 (Tue)	Methods of mass spectrometry 1
	Section 2 (Thurs)	Methods of mass spectrometry 2
	Section 3 (Fri)	2D gel electrophoresis 1
Week 6	Section 1 (Tue)	Test 1
	Section 2 (Thurs)	Protein sequencing
	Section 3 (Fri)	2D gel electrophoresis 2
Week 7	Section 1 (Tue)	Recovery and fractionation of proteins using multi-dimensional techniques
	Section 2 (Thurs)	Interpretation of mass spectra 1
	Section 3 (Fri)	Mass spec 1
Week 8	Section 1 (Tue)	Interpretation of mass spectra 2
	Section 2 (Thurs)	ESI
	Section 3 (Fri)	2D gel electrophoresis 2
Week 9	Section 1 (Tue)	Introduction
	Section 2 (Thurs)	Methods of mass spectrometry 3
	Section 3 (Fri)	Mass spec 2
Week 10	Section 1 (Tue)	MALDI-TOF
	Section 2 (Thurs)	Quantitative mass spectrometry
	Section 3 (Fri)	Mass spec 3
Week 11	Section 1 (Tue)	Metabolite ID

	Section 2 (Thurs)	Metabolomics
	Section 3 (Fri)	Mass spec 4
Week 12	Section 1 (Tue)	Introduction to systems biology
	Section 2 (Thurs)	Test 2
	Section 3 (Fri)	Final test

Animal and Cell Culture Model Systems
BMS 314

Time/location: Spring 2015
T, Th 10:30-11:50 (lecture), TBD (tentative Massry Conference Center)
W 9:00-12:00 (laboratory), CRC 213 and 214

Course Instructor: Brian Parr, Ph.D.
Department of Biomedical Sciences
1 Discovery Drive, Room 342B
518-591-7213
bparr@albany.edu
Office hours TBD

Teaching assistant: TBD

Course Description

The goal of this course is to provide students with a solid background in advanced technologies used to generate animal and cell culture models of human diseases. Laboratory exercises will be utilized to further students' understanding of the model systems and provide hands on experience in the performance of widely used techniques. The course will begin with a brief review of the most commonly used animal model systems. Techniques used to generate and analyze these models will be discussed in detail. The use of cell culture and in vitro differentiation systems as alternatives to animal models will be considered. Applications of the technologies will include nucleic acid extraction from cells and tissues, histological examination of tissues, laser capture microdissection, flow cytometry, and in vitro cell differentiation assays.

The lecture topics will be partnered with laboratory exercises that provide hands-on experience so that students develop a more complete understanding of these technologies. A focus will be on the instrumentation required to perform the various technologies. While instrument operation and data analysis will be highlighted, there will be significant coverage of other key issues such as experimental design and troubleshooting.

Prerequisite:

A BIO 212Y Introductory Genetics, or equivalent from another institution
A BIO 217 Cell Biology, or equivalent from another institution

Course Learning Objectives

1. Students will demonstrate an understanding of the uses of animal model systems in both theory and performance.

2. Students will develop and demonstrate a thorough understanding of cell culture systems as alternatives to animal models.

3. Students will demonstrate an understanding of in vitro differentiation systems as possible alternatives to both cell culture and in vivo animal model systems.

4. Students will develop and demonstrate a thorough understanding of the analysis of histological samples from animal models.

5. Students will develop and demonstrate a thorough understanding of laser capture microdissection, the instrumentation required for its performance, and its use in isolating cell populations from tissues of animal models.

6. Students will develop and demonstrate a thorough understanding of flow cytometry, the instrumentation required for its performance, the analysis of flow cytometry data, and the applications that are facilitated by this technology.

7. Students will demonstrate an understanding of the uses of in vitro differentiation systems.

8. Students will demonstrate an understanding and utilization of appropriate laboratory safety procedures.

Class Policies:

Attendance: Regular attendance is necessary for academic achievement in this course. The instructor should be notified promptly in case of absence, with a valid reason provided. For absences related to medical issues, please refer to the University's Medical Excuse Policy (www.albany.edu/health_center/medicalexcuse.shtml). If absent from lecture, the student is responsible for all material covered during that session. If absent from laboratory, the student will be provided with an alternative exercise that will need to be completed. More than three unexcused absences in lecture or laboratory will result in a 5% reduction of the lecture or laboratory component of the final course grade.

Safety: Students are required to adhere to the University's laboratory safety guidelines during laboratory sessions. These guidelines will be reviewed during the first laboratory session.

Academic Integrity

Students are expected to adhere to university policies on academic integrity (see http://www.albany.edu/undergraduate_bulletin/regulations.html). Any form of academic dishonesty, including cheating or plagiarism, will not be tolerated and will lead to disciplinary action as deemed appropriate by the faculty and/or the University's judicial process.

Course Grades

Two tests will be administered to assess the students' comprehension of material covered in lecture, a mid-term examination and a final examination. In addition, lecture homework will be assigned and graded as described below. Performance assessments of each laboratory exercise in the form of homework will also be assigned and graded.

The final grade weightings will consist of 10% from a mid-term examination, 15% from the final examination, 50% from lecture homework assignments, and 25% from laboratory homework assessments. Students will be assigned an alphabetical grade (A-F) for the course.

Homework Assignments

There will be 5 homework assignments during the semester (see course schedule for due dates). Unless otherwise stated, the homework assignments will be posted one week prior to their due date. The homework assignments will focus on exercises designed to further the understanding of the most important concepts covered in the class. Homework assignments will be collected at the beginning of the class when they are due. After the assignments are graded and returned to students, answers will be posted on the course website.

Course Reading

Supplementary course material such as handouts and journal articles will be posted on the course Blackboard site several days prior to the relevant course session. Journal article also may be accessed via PubMed (http://www.ncbi.nlm.nih.gov/pubmed/).

Students registered for the class can access the course material through the MyUalbany link to Blackboard Learning System. Notes and readings will be posted as Adobe Acrobat (.pdf) or Microsoft Word (.docx) files. Assignments will be distributed as Word files.

The primary course textbook will be R. Ian Freshney "Culture of Animal Cells" (Wiley-Liss). Following is a preliminary list of readings for the individual class sessions (also see course schedule below). Readings will be updated as appropriate when more recent books/articles become available.

Session 2-1 - Castrop, "Genetically modified mice—successes and failures of a widely used technology", Eur. J. Physiol. 459:557.2010.

Session 2-2 - Freshney, Chapter 23

Session 5-1 - Freshney, Chapter 11

Session 5-2 - Freshney, Chapter 20

Session 6-1 - Freshney, Chapter 12

Session 6-2 - Freshney, Chapter 14

Sessions 8-1 and 8-2 - Adams and van der Weyden, "Contemporary approaches for modifying the mouse genome", Physiol. Genomics34:225. 2008.

Sessions 10-1 and 10-2 - Freshney, Chapter 24

Session 11-2 - Yu and Thomson, “Pluripotent Stem Cell Lines”, Genes Dev. 22:1987, 2008.

Sessions 11-1, 12-1, and 12-2 - Murry and Keller, “Differentiation of Embryonic Stem Cells to Clinically Relevant Populations: Lessons from Embryonic Development, Cell 132:661.2008.

Course Schedule

The lecture portion of the class will meet twice a week for 80 minute sessions (approximately 26 lecture sessions total). Each topic will be covered during the course of 1-3 sessions. Laboratory sessions will last for 3 hours, once a week. In the event that a student misses a laboratory session due to illness or unexpected family emergency, they should contact the instructor to make up the lab exercise using instructor generated data. The topics to be covered during the course are as follows:

Session #	Class Topic (* = includes associated laboratory exercise)	Material to be covered	Reading and homework assignments
Week 1-1	Introduction to model systems	Rationale for model systems	
1-2	Widely used animal model systems	Mouse, rat, pig, chick, frog, zebrafish, Drosophila	
Lab 1	No laboratory meeting		
Week 2-1	Detailed example of a model system	Transgenic mice, strengths and weaknesses of different systems	Castrop article
2-2	Disease models	Cancer models	Chapter 23- Freshney
Lab 2	Molecular analysis of animal models		
Week 3-1	Sample analysis I*	RNA, DNA extraction	Homework assignment 1 due
3-2	Sample analysis II*	Histology- embedding, sectioning, staining tissues	
Lab 3	Histological analysis of tissue from models		
Week 4-1	Sample analysis III*	Laser capture microdissection	
4-2	Technologies for downstream analysis of animal model systems	End use of animal models	Homework assignment 2 due
Lab 4	Laser capture microdissection		
Week 5-1	Introduction to cell culture models	Commonly used mammalian cell culture systems	Chapter 11- Freshney
5-2	Cell culture methods I	Culture and analysis of mammalian cell culture lines	Chapter 20- Freshney
Lab 5	Introduction to cell culture methods		
Week 6-1	Cell culture methods II*		Chapter 12- Freshney
6-2	Sample analysis IV*	Flow cytometry	Chapter 14- Freshney
Lab 6	Flow cytometry		
Week 7-1	Mid-term examination		
7-2	Introduction to stem cells	Embryonic stem cells, adult stem cells, cancer stem cells	
Lab 7	Review of advanced cell culture methods		
Week 8-1	Use of stem cells as model systems	Gene targeting in stem cells	Adams and van der Weyden article
8-2	Stem cell culture*	Culture of mammalian stem cells	Adams and van der Weyden article
Lab 8	ES cell culture		
Week 9-1	In vivo vs. in vitro systems	Relative merits of different types of model systems	Homework assignment 3 due

9-2	On line resources	Computer and internet resources for studying model systems	
Lab 9	Computer exercises using on line resources		
Week 10-1	Organ culture systems	Widely used organ culture systems such as kidneys	Chapter 24- Freshney
10-2	Methods of organ culture		Chapter 24- Freshney
Lab 10	Establishment of a simple organ culture system		
Week 11-1	In vitro differentiation systems		Homework assignment 4 due. Murry and Keller article
11-2	Induced pluripotent stem cells	iPS cells as a model system	Yu and Thomson article
Lab 11	Culture of iPS cells		
Week 12-1	In vitro differentiation of ES and iPS cells I*	Techniques for generating diverse cell types from ES/iPS cells	Murry and Keller article
12-2	In vitro differentiation of ES and iPS cells II*		Murry and Keller article
Lab 12	In vitro differentiation assays		
Week 13-1	Course review and final assignments due		Homework assignment 5 due
13-2	Final Examination		

Instrumentation in Biotechnology Research Internship, Molecular Core Lab
BMS 410, Spring Summer 2015
Course Syllabus:

Location and Meeting Times:
CRC 223, times TBD (100 hours total)

Course Director:

John Tine, Ph.D.
School of Public Health
University at Albany, SUNY
Cancer Research Center
1 Discovery Drive
Rensselaer, NY 12144
Tel: 518-591-7212
Office: CRC 342C, hours TBD
jtine@albany.edu

Course Description:

The goal of this internship course is to provide students with research experiences in the UAlbany Cancer Research Center's Molecular Biology laboratory where they will gain practical, hands-on experience with the use of instrumentation in molecular biology in a core laboratory environment. Students will perform molecular biological experiments required for projects in the core laboratory as determined by the laboratory director and supervising laboratory staff. This experience will build on prior course work that has provided students with an understanding of the theory, operation, and application of instrumentation in molecular biology.

Prerequisite:

BMS 310 Molecular and Genomic Approaches in Biotechnology I

Student Objectives:

- Students will demonstrate laboratory skills in molecular biology by performing experiments in the molecular biology core laboratory. Attendance for ~7 hours/week will be required.
- Students will demonstrate an understanding of the theory, operation, and application of instrumentation in molecular biology.
- Students will demonstrate the ability to keep accurate written records of their laboratory activities.
- Students will demonstrate appropriate conduct in the laboratory environment.
- Students will demonstrate an understanding and utilization of appropriate laboratory safety procedures.

Grading:

Assessments of the student's performance in the laboratory will occur at midterm and at the end of the semester. The evaluation will use a skills rubric that assesses the student's performance with regard to lab protocols, technical skill, behavior, and communication. The evaluation will be performed by the laboratory director with input from lab staff as appropriate. The final grade will be based on the results of these assessments, with the midterm assessment contributing 40% and the final assessment contributing 60% toward the final grade.

The grading scale for the course is follows:

A = 93-100	A- = 90-92	
B+ = 87-89	B = 83-88	B- = 80-82
C+ = 77-79	C = 73-78	C- = 70-72
D+ = 67-69	D = 63-68	D- = 60-62
E = 0-59		

Class Policies:

Attendance: Students will fulfill a time requirement of 100 hours during the course of the semester, with a schedule mutually agreed on by the student and Course Director. Failure to complete the time requirement will result in a grade of E.

Safety: Students are required to adhere to the University's laboratory safety guidelines while in the laboratory. These guidelines will be reviewed at the beginning of the internship.

Academic Integrity:

Students are expected to adhere to university policies on academic integrity (see http://www.albany.edu/undergraduate_bulletin/regulations.html). Any form of academic dishonesty will not be tolerated and will lead to disciplinary action as deemed appropriate by the faculty and/or the University's judicial process.

From the University's Standards of Academic Integrity Policy, Fall 2013:
"Every student has the responsibility to become familiar with the standards of academic integrity at the University. Faculty members must specify in their syllabi information about academic integrity, and may refer students to this policy for more information. Nonetheless, student claims of ignorance, unintentional error, or personal or academic pressures cannot be excuses for violation of academic integrity. Students are responsible for familiarizing themselves with the standards and behaving accordingly, and UAlbany faculty are responsible for teaching, modeling and upholding them. Anything less undermines the worth and value of our intellectual work, and the reputation and credibility of the University at Albany degree."

Course Schedule:

Week 1: Students will meet with laboratory director/supervisory staff to discuss activities, begin laboratory safety training, begin laboratory work

Weeks 2-14: Weekly attendance, performance of laboratory work, documentation of hours and work performed

Evaluation: Performed by laboratory director with appropriate input from supervisory laboratory staff at midterm and the end of the semester

Total hours required: 100

Instrumentation in Biotechnology Research Internship, Proteomics Core Lab
BMS 411, Spring Summer 2015
Course Syllabus:

Location and Meeting Times:
CRC 330, times TBD (100 hours total)

Course Director:

Qishan Lin, PhD
Department of Biomedical Sciences
School of Public Health
University at Albany, SUNY
Cancer Research Center
1 Discovery Drive
Rensselaer, NY 12144
Tel: (518)591-7214
Office: CRC 342H, hours TBD
qlin@albany.edu

Course Description:

The goal of this internship course is to provide students with research experiences in the UAlbany Cancer Research Center's Proteomics laboratory where they will gain practical, hands-on experience with the use of instrumentation in proteomics in a core laboratory environment. Students will perform genomics experiments required for projects in the core laboratory as determined by the laboratory director and supervising laboratory staff. This experience will build on prior course work that has provided students with an understanding of the theory, operation, and application of instrumentation in proteomics.

Prerequisite:

BMS 312 Proteomic Methodologies in Biotechnology

Student Objectives:

- Students will demonstrate laboratory skills in proteomics by performing experiments in the proteomics core laboratory. Attendance for ~7 hours/week will be required.
- Students will demonstrate an understanding of the theory, operation, and application of instrumentation in proteomics.
- Students will demonstrate the ability to keep accurate written records of their laboratory activities.
- Students will demonstrate appropriate conduct in the laboratory environment.
- Students will demonstrate an understanding and utilization of appropriate laboratory safety procedures.

Grading:

Assessments of the student's performance in the laboratory will occur at midterm and at the end of the semester. The evaluation will use a skills rubric that assesses the student's performance with regard to lab protocols, technical skill, behavior, and communication. The evaluation will be performed by the laboratory director with input from lab staff as appropriate. The final grade will be based on the results of these assessments, with the midterm assessment contributing 40% and the final assessment contributing 60% toward the final grade.

The grading scale for the course is follows:

A = 93-100	A- = 90-92	
B+ = 87-89	B = 83-88	B- = 80-82
C+ = 77-79	C = 73-78	C- = 70-72
D+ = 67-69	D = 63-68	D- = 60-62
E = 0-59		

Class Policies:

Attendance: Students will fulfill a time requirement of 100 hours during the course of the semester, with a schedule mutually agreed on by the student and Course Director. Failure to complete the time requirement will result in a grade of E.

Safety: Students are required to adhere to the University's laboratory safety guidelines while in the laboratory. These guidelines will be reviewed at the beginning of the internship.

Academic Integrity:

Students are expected to adhere to university policies on academic integrity (see http://www.albany.edu/undergraduate_bulletin/regulations.html). Any form of academic dishonesty will not be tolerated and will lead to disciplinary action as deemed appropriate by the faculty and/or the University's judicial process.

From the University's Standards of Academic Integrity Policy, Fall 2013:
"Every student has the responsibility to become familiar with the standards of academic integrity at the University. Faculty members must specify in their syllabi information about academic integrity, and may refer students to this policy for more information. Nonetheless, student claims of ignorance, unintentional error, or personal or academic pressures cannot be excuses for violation of academic integrity. Students are responsible for familiarizing themselves with the standards and behaving accordingly, and UAlbany faculty are responsible for teaching, modeling and upholding them. Anything less undermines the worth and value of our intellectual work, and the reputation and credibility of the University at Albany degree."

Course Schedule:

Week 1: Students will meet with laboratory director/supervisory staff to discuss activities, begin laboratory safety training, begin laboratory work

Weeks 2-14: Weekly attendance, performance of laboratory work, documentation of hours and work performed

Evaluation: Performed by laboratory director with appropriate input from supervisory laboratory staff at midterm and the end of the semester

Total hours required: 100

Instrumentation in Biotechnology Research Internship, Genomics Core Lab
BMS 412, Spring Summer 2015
Course Syllabus:

Location and Meeting Times:
CRC 328, times TBD (100 hours total)

Course Director:

Sridar V. Chittur PhD
Department of Biomedical Sciences
School of Public Health
Director, Microarray & HT Sequencing Core
University at Albany, SUNY
Center for Functional Genomics
Cancer Research Center
One Discovery Dr
Rensselaer, NY 12144
Office: CRC 342G, hours TBD
Tel:518-591-7215
schittur@albany.edu

Course Description:

The goal of this internship course is to provide students with research experiences in the UAlbany Cancer Research Center's Microarray laboratory where they will gain practical, hands-on experience with the use of instrumentation in genomics in a core laboratory environment. Students will perform genomics experiments required for projects in the core laboratory as determined by the laboratory director and supervising laboratory staff. This experience will build on prior course work that has provided students with an understanding of the theory, operation, and application of instrumentation in genomics.

Prerequisite:

BMS 311 Molecular and Genomic Approaches in Biotechnology II

Student Objectives:

- Students will demonstrate laboratory skills in genomics by performing experiments in the microarray core laboratory. Attendance for ~7 hours/week will be required.
- Students will demonstrate an understanding of the theory, operation, and application of instrumentation in genomics.
- Students will demonstrate the ability to keep accurate written records of their laboratory activities.
- Students will demonstrate appropriate conduct in the laboratory environment.
- Students will demonstrate an understanding and utilization of appropriate laboratory safety procedures.

Grading:

Assessments of the student's performance in the laboratory will occur at midterm and at the end of the semester. The evaluation will use a skills rubric that assesses the student's performance with regard to lab protocols, technical skill, behavior, and communication. The evaluation will be performed by the laboratory director with input from lab staff as appropriate. The final grade will be based on the results of these assessments, with the midterm assessment contributing 40% and the final assessment contributing 60% toward the final grade.

The grading scale for the course is follows:

A = 93-100	A- = 90-92	
B+ = 87-89	B = 83-88	B- = 80-82
C+ = 77-79	C = 73-78	C- = 70-72
D+ = 67-69	D = 63-68	D- = 60-62
E = 0-59		

Class Policies:

Attendance: Students will fulfill a time requirement of 100 hours during the course of the semester, with a schedule mutually agreed on by the student and Course Director. Failure to complete the time requirement will result in a grade of E.

Safety: Students are required to adhere to the University's laboratory safety guidelines while in the laboratory. These guidelines will be reviewed at the beginning of the internship.

Academic Integrity:

Students are expected to adhere to university policies on academic integrity (see http://www.albany.edu/undergraduate_bulletin/regulations.html). Any form of academic dishonesty will not be tolerated and will lead to disciplinary action as deemed appropriate by the faculty and/or the University's judicial process.

From the University's Standards of Academic Integrity Policy, Fall 2013:
"Every student has the responsibility to become familiar with the standards of academic integrity at the University. Faculty members must specify in their syllabi information about academic integrity, and may refer students to this policy for more information. Nonetheless, student claims of ignorance, unintentional error, or personal or academic pressures cannot be excuses for violation of academic integrity. Students are responsible for familiarizing themselves with the standards and behaving accordingly, and UAlbany faculty are responsible for teaching, modeling and upholding them. Anything less undermines the worth and value of our intellectual work, and the reputation and credibility of the University at Albany degree."

Course Schedule:

Week 1: Students will meet with laboratory director/supervisory staff to discuss activities, begin laboratory safety training, begin laboratory work

Weeks 2-14: Weekly attendance, performance of laboratory work, documentation of hours and work performed

Evaluation: Performed by laboratory director with appropriate input from supervisory laboratory staff at midterm and the end of the semester

Total hours required: 100

Instrumentation in Biotechnology Research Internship, Cell Analysis Core Lab
BMS 414, Spring Summer 2015
Course Syllabus:

Location and Meeting Times:
CRC 332, times TBD (100 hours total)

Course Director:

Brian Parr, Ph.D.
Department of Biomedical Sciences
School of Public Health
University at Albany, SUNY
Cancer Research Center
1 Discovery Drive
Rensselaer, NY 12144
Office: CRC 342B, hour TBD
518-591-7213
bparr@albany.edu

Course Description:

The goal of this internship course is to provide students with research experiences in the UAlbany Cancer Research Center's Mouse Transgenics laboratory where they will gain practical, hands-on experience with the use of instrumentation in cell analysis in a core laboratory environment. Students will perform cell analysis experiments required for projects in the core laboratory as determined by the laboratory director and supervising laboratory staff. This experience will build on prior course work that has provided students with an understanding of the theory, operation, and application of instrumentation in cell analysis.

Prerequisite:

BMS 314 Animal and Cell Culture Model Systems

Student Objectives:

- Students will demonstrate laboratory skills in cell analysis by performing experiments in the mouse transgenics core laboratory. Attendance for ~7 hours/week will be required.
- Students will demonstrate an understanding of the theory, operation, and application of instrumentation in cell analysis.
- Students will demonstrate the ability to keep accurate written records of their laboratory activities.
- Students will demonstrate appropriate conduct in the laboratory environment.
- Students will demonstrate an understanding and utilization of appropriate laboratory safety procedures.

Grading:

Assessments of the student's performance in the laboratory will occur at midterm and at the end of the semester. The evaluation will use a skills rubric that assesses the student's performance with regard to lab protocols, technical skill, behavior, and communication. The evaluation will be performed by the laboratory director with input from lab staff as appropriate. The final grade will be based on the results of these assessments, with the midterm assessment contributing 40% and the final assessment contributing 60% toward the final grade.

The grading scale for the course is follows:

A = 93-100	A- = 90-92	
B+ = 87-89	B = 83-88	B- = 80-82
C+ = 77-79	C = 73-78	C- = 70-72
D+ = 67-69	D = 63-68	D- = 60-62
E = 0-59		

Class Policies:

Attendance: Students will fulfill a time requirement of 100 hours during the course of the semester, with a schedule mutually agreed on by the student and Course Director. Failure to complete the time requirement will result in a grade of E.

Safety: Students are required to adhere to the University's laboratory safety guidelines while in the laboratory. These guidelines will be reviewed at the beginning of the internship.

Academic Integrity:

Students are expected to adhere to university policies on academic integrity (see http://www.albany.edu/undergraduate_bulletin/regulations.html). Any form of academic dishonesty will not be tolerated and will lead to disciplinary action as deemed appropriate by the faculty and/or the University's judicial process.

From the University's Standards of Academic Integrity Policy, Fall 2013:
"Every student has the responsibility to become familiar with the standards of academic integrity at the University. Faculty members must specify in their syllabi information about academic integrity, and may refer students to this policy for more information. Nonetheless, student claims of ignorance, unintentional error, or personal or academic pressures cannot be excuses for violation of academic integrity. Students are responsible for familiarizing themselves with the standards and behaving accordingly, and UAlbany faculty are responsible for teaching, modeling and upholding them. Anything less undermines the worth and value of our intellectual work, and the reputation and credibility of the University at Albany degree."

Course Schedule:

Week 1: Students will meet with laboratory director/supervisory staff to discuss activities, begin laboratory safety training, begin laboratory work

Weeks 2-14: Weekly attendance, performance of laboratory work, documentation of hours and work performed

Evaluation: Performed by laboratory director with appropriate input from supervisory laboratory staff at midterm and the end of the semester

Total hours required: 100

Instrumentation in Biotechnology Research Internship, Academic Lab
BMS 415, Spring Summer 2015
Course Syllabus:

Location and Meeting Times:
CRC various, times TBD (100 hours total)

Course Director:

Martin Tenniswood, PhD
Department of Biomedical Sciences
School of Public Health
University at Albany, SUNY
Cancer Research Center
1 Discovery Drive
Rensselaer, NY 12144
Tel: (518)591-7200
Office: CRC 304C, hours TBD
mtenniswood@albany.edu

Course Description:

The goal of this internship course is to provide students with research experiences in an academic laboratory of the UAlbany Cancer Research Center where they will gain practical, hands-on experience with the use of instrumentation in molecular biology, genomics, proteomics, or cell analysis in an academic laboratory environment. Students will perform experiments required for projects in the academic laboratory as determined by the laboratory principle investigator and supervising laboratory staff. This experience will build on prior course work that has provided students with an understanding of the theory, operation, and application of instrumentation in molecular biology, genomics, proteomics, and cell analysis.

Students can choose from CRC academic laboratories under the direction of the following principle investigators, with the agreement of the principle investigator required prior to registration:

Martin Tenniswood, Ph.D.
JoEllen Welsh, Ph.D.
Douglas Conklin, Ph.D
Ramune Reliene, Ph.D.
Jason Herschkowitz, Ph.D.

Prerequisites:

BMS 310 Molecular and Genomic Approaches in Biotechnology I
BMS 312 Proteomic Methodologies in Biotechnology
BMS 314 Animal and Cell Culture Model Systems

Student Objectives:

- Students will demonstrate laboratory skills in molecular biology, genomics, proteomics, or cell analysis by performing experiments in the academic laboratory. Attendance for ~7 hours/week will be required.
- Students will demonstrate an understanding of the theory, operation, and application of instrumentation in molecular biology, genomics, proteomics, or cell analysis.
- Students will demonstrate the ability to keep accurate written records of their laboratory activities.
- Students will demonstrate appropriate conduct in the laboratory environment.
- Students will demonstrate an understanding and utilization of appropriate laboratory safety procedures.

Grading:

Assessments of the student's performance in the laboratory will occur at midterm and at the end of the semester. The evaluation will use a skills rubric that assesses the student's performance with regard to lab protocols, technical skill, behavior, and communication. The evaluation will be performed by the laboratory director with input from lab staff as appropriate. The final grade will be based on the results of these assessments, with the midterm assessment contributing 40% and the final assessment contributing 60% toward the final grade.

The grading scale for the course is follows:

A = 93-100	A- = 90-92	
B+ = 87-89	B = 83-88	B- = 80-82
C+ = 77-79	C = 73-78	C- = 70-72
D+ = 67-69	D = 63-68	D- = 60-62
E = 0-59		

Class Policies:

Attendance: Students will fulfill a time requirement of 100 hours during the course of the semester, with a schedule mutually agreed on by the student and Course Director. Failure to complete the time requirement will result in a grade of E.

Safety: Students are required to adhere to the University's laboratory safety guidelines while in the laboratory. These guidelines will be reviewed at the beginning of the internship.

Academic Integrity:

Students are expected to adhere to university policies on academic integrity (see http://www.albany.edu/undergraduate_bulletin/regulations.html). Any form of academic dishonesty will not be tolerated and will lead to disciplinary action as deemed appropriate by the faculty and/or the University's judicial process.

From the University's Standards of Academic Integrity Policy, Fall 2013:
"Every student has the responsibility to become familiar with the standards of academic integrity at the University. Faculty members must specify in their syllabi information about academic integrity, and may refer students to this policy for more information. Nonetheless, student claims of ignorance, unintentional error, or personal or academic pressures cannot be excuses for violation of academic integrity. Students are responsible for familiarizing themselves with the standards and behaving accordingly, and UAlbany faculty are responsible for teaching, modeling and upholding them. Anything less undermines the worth and value of our intellectual work, and the reputation and credibility of the University at Albany degree."

Course Schedule:

Week 1:	Students will meet with laboratory director/supervisory staff to discuss activities, begin laboratory safety training, begin laboratory work
Weeks 2-14:	Weekly attendance, performance of laboratory work, documentation of hours and work performed
Evaluation:	Performed by laboratory director with appropriate input from supervisory laboratory staff at midterm and the end of the semester

Total hours required: 100

Bio-Instrumentation Cooperative Training Internship
BMS 420, Fall 2015
Course Syllabus:

Location and Meeting Times:
CRC or various local laboratories, times TBD (100 hours total)

Course Director:

Martin Tenniswood, PhD
Department of Biomedical Sciences
School of Public Health
University at Albany, SUNY
Cancer Research Center
1 Discovery Drive
Rensselaer, NY 12144
Tel: (518)591-7200
Office: CRC 304C, hours TBD
mtenniswood@albany.edu

Course Description:

The goal of this internship course is to provide students with real-world experience in the use of biotechnological instrumentation to address broader research questions, as well as an understanding of the expectations that come with a professional career in laboratory research. Students will perform cooperative training with local biotechnology companies or larger academic laboratories. This research experience will build on prior course work and internships that have provided students with both practical experience with and an understanding of the theory, operation, and application of instrumentation in molecular biology, genomics, proteomics, and cell analysis research.

Internships will be arranged in consultation with the Course Director. Placements may include academic laboratories within UAlbany or at other area institutions, or local biotechnology companies. A selection of the local companies who have agreed to participate in this course includes:

Bioharvest, Ltd.
Regeneron Pharmaceuticals
Intidyn
Ultradian Diagnostics
Next Advance

Prerequisites:

Completion of any two of the following:
BMS 410 Instrumentation in Biotechnology Internship, Molecular Biology Core Lab
BMS 411 Instrumentation in Biotechnology Internship, Proteomics Core Lab

BMS 412 Instrumentation in Biotechnology Internship, Genomics Core Lab
BMS 414 Instrumentation in Biotechnology Internship, Cell Analysis Core Lab
BMS 415 Instrumentation in Biotechnology Internship, Academic Lab

Student Objectives:

- Students will demonstrate professional laboratory skills by working in the biotechnology or academic laboratory. Attendance for ~7 hours/week will be required.
- Students will demonstrate appropriate conduct in the laboratory environment and follow laboratory-specific standards.
- Students will demonstrate an understanding and utilization of appropriate laboratory safety procedures.

Grading:

Assessments of the student's performance in the laboratory will occur at midterm and at the end of the semester. The evaluation will use a skills rubric that assesses the student's performance with regard to lab protocols, technical skill, behavior, and communication. The evaluation will be performed by the laboratory director with input from lab staff as appropriate. The final grade will be based on the results of these assessments, with the midterm assessment contributing 40% and the final assessment contributing 60% toward the final grade.

The grading scale for the course is follows:

A = 93-100	A- = 90-92	
B+ = 87-89	B = 83-88	B- = 80-82
C+ = 77-79	C = 73-78	C- = 70-72
D+ = 67-69	D = 63-68	D- = 60-62
E = 0-59		

Class Policies:

Attendance: Students will fulfill a time requirement of 100 hours during the course of the semester, with a schedule mutually agreed on by the student and supervisor at the host laboratory. Failure to complete the time requirement will result in a grade of E.

Safety: Students are required to adhere to the host laboratory's safety guidelines and other policies. These guidelines/policies will be reviewed at the beginning of the internship.

Academic Integrity:

Students are expected to adhere to university policies on academic integrity (see http://www.albany.edu/undergraduate_bulletin/regulations.html). Any form of academic dishonesty will not be tolerated and will lead to disciplinary action as deemed appropriate by the faculty and/or the University's judicial process.

From the University's Standards of Academic Integrity Policy, Fall 2013:
"Every student has the responsibility to become familiar with the standards of academic integrity at the University. Faculty members must specify in their syllabi information about academic integrity, and may refer students to this policy for more information. Nonetheless, student claims of ignorance, unintentional error, or personal or academic pressures cannot be excuses for violation of academic integrity. Students are responsible for familiarizing themselves with the standards and behaving accordingly, and UAlbany faculty are responsible for teaching, modeling and upholding them. Anything less undermines the worth and value of our intellectual work, and the reputation and credibility of the University at Albany degree."

Course Schedule:

Week 1:	Students will meet with laboratory director/supervisory staff to discuss activities, begin laboratory safety training, begin laboratory work
Weeks 2-14:	Weekly attendance, performance of laboratory work, documentation of hours and work performed
Evaluation:	Performed by laboratory director with appropriate input from supervisory laboratory staff at midterm and the end of the semester

Total hours required: 100

University at Albany
Program Revision – Interdisciplinary Studies

Appendix 2

Program Schedule and Curriculum

SUNY Undergraduate Sample Program Schedule

Campus Name	**University at Albany, State University of New York**
Program/Track Title and Award	**BS in Interdisciplinary Studies, with a faculty-initiated concentration in Bio-Instrumentation**

	Semester	Quarter	Trimester	Other
Calendar Type	X			

SUNY Transfer Path Name (if one exists) **<----- Use Dropdown Arrow.**

Use the table to show **how a typical student may progress through the program. Check all columns that apply to a course or enter credits where applicable.**

KEY **Course Type: Required (R), Restricted Elective (RE), Free Elective (FE). Course Credits: Number of Credits for individual course (Enter number.) GER Area: SUNY General Education Requirement Area (Enter Area Abbreviation from the drop-down menu.) GER Credits: (Enter number of course credits.) LAS: Liberal Arts & Sciences Credits (Enter X if course is an LAS course.) Major: Major requirement (Enter X.) TPath: SUNY Transfer Path Major & Cognate Courses (Enter X.) Elective/Other: Electives or courses other than specified categories (Enter X.) Upper Div: Courses intended primarily for juniors and seniors outside of the major (Enter X.) Upper Div Major: Courses intended primarily for juniors and seniors within the major (Enter X.) New: new course (Enter X.) Co/Prerequisite(s): List co/prerequisite(s) for the noted courses. SUNY GER Area Abbreviations (the first five listed in order of their frequency of being required by SUNY campuses): Basic Communication (BC), Math (M), Natural Sciences (NS), Social Science (SS), Humanities (H), American History (AH), The Arts (AR), Other World Civilizations (OW), Western Civilization (WC), Foreign Language (FL).**

The table will automatically update the number of credits, courses and categories in the program totals table at the bottom of the chart.

Label each term in sequence, consistent with the institution's academic calendar (e.g., Fall 1, Spring 1, Fall 2.

Fall 1

Course Number & Title (& Type)	Number of Credits	GER Area	GE Credits	LAS	Major	Elective/Other	Upper Div	Upper Div Major	TPath	New Course	Co/Prerequisite
ABIO 120 General Biology 1 - R	3	NS	3	X	X						
ACHM 120 - General Chemistry 1 - R	3	NS	3	X	X						
ACHM 124 - General Chemistry 1 lab - R	1			X	X						
AMAT 108 - Elementary Statistics - R	3	M	3	X	X						
Humanities Gen Ed - RE	3	H	3	X							
Social Science Gen Ed - RE	3	SS	3	X							
Term Totals	**16**	**5**	**15**	**16**	**10**						**(X)**

Spring 1

Course Number & Title (& Type)	Number of Credits	GER Area	GE Credits	LAS	Major	Elective/Other	Upper Div	Upper Div Major	TPath	New Course	Co/Prerequisite
ABIO 121 - General Biology 11 - R	3	NS	3	X	X						ABIO 120
ACHM 121 - General Chemistry 11 - R	3	NS	3	X	X						ACHM 120
ACHM 125 - General Chemistry 11 lab - R	1			X	X						
AMAT 112 - Calculus 1 - R	4	M	4	X	X						
UUNI 110 - Writing and Critical Inquiry - R	3	BC	3	X							
Term Totals	**14**	**4**	**13**	**14**	**11**						**(X)**

Fall 2

Course Number & Title (& Type)	Number of Credits	GER Area	GE Credits	LAS	Major	Elective/Other	Upper Div	Upper Div Major	TPath	New Course	Co/Prerequisite
APHY 140 - Physics 1	3	NS	3	X	X						
APHY 145 - Physics 1 Lab	1			X	X						
ACHM 220 - Organic Chemistry - R	3			X	X						ACHM 120
ACHM 222 - Organic Chemistry Lab - R	1			X	X						ACHM 220
ABIO 201 - Intro to Biological Investigation 1 - R	1			X	X						BIO 121/CHM 121/CHM 125
Foreign Language Gen Ed - RE	4	FL	4	X							
International Perspectives Gen Ed - RE	3	OW	3	X							
Term Totals	**16**	**3**	**10**	**16**	**9**						**(X)**

Spring 2

Course Number & Title (& Type)	Number of Credits	GER Area	GE Credits	LAS	Major	Elective/Other	Upper Div	Upper Div Major	TPath	New Course	Co/Prerequisite
ABIO 202Z - Intro to Biological Investigations 11 - R	1			X	X						BIO 121/CHM 121/CHM 125
ABIO 212 - Genetics - R	4			X	X						ABIO 121
ABIO 217 - Cell Biology - R	3			X	X						ABIO 121
US Gen Ed - RE	3	AH	3	X							
Arts Gen Ed - RE	3	AR	3	X							
Term Totals	**14**	**2**	**6**	**14**	**8**						**(X)**

Fall 3

Course Number & Title (& Type)	Number of Credits	GER Area	GE Credits	LAS	Major	Elective/Other	Upper Div	Upper Div Major	TPath	New Course	Co/Prerequisite
HSPH 201- Introduction to Public Health - R	3			X	X						
HBMS 310 - Molecular & Genomic Apps in Biotech 1- R	4				X		X	X		X	ABIO 212, ABIO 217
HBMS 312 - Proteomic Methodologies in Biotech - R	4				X		X	X		X	ACHM 120, ABIO 217
Challenges in the 21st Century Gen Ed - RE	3			X							
Upper level Elective - FE	2					X	X				
Term Totals	**16**			**6**	**11**	**2**	**10**	**8**		**2**	**(X)**

Spring 3

Course Number & Title (& Type)	Number of Credits	GER Area	GE Credits	LAS	Major	Elective/Other	Upper Div	Upper Div Major	TPath	New Course	Co/Prerequisite
HSPH 231 - Concepts in Epidemiology - R	3			X	X						AMAT 108
HBMS 311 - Molecular & Genomic Apps in Biotech 11- R	4				X		X	X		X	HBMS 310
HBMS 314 - Animal and Cell Culture Model Systems-R	4				X		X	X		X	ABIO 212, ABIO 217
HBMS - Biotechnology Research Internship - R	3				X		X	X		X	HBMS 300 level
(Choose between HBMS 410,411,412,414,415)											
Term Totals	**14**			**3**	**14**		**11**	**11**		**3**	**(X)**

Fall 4

Course Number & Title (& Type)	Number of Credits	GER Area	GE Credits	LAS	Major	Elective/Other	Upper Div	Upper Div Major	TPath	New Course	Co/Prerequisite
HBMS 505 - Biological Basis of Public Health	3				X		X	X			ABIO 120
HBMS - Biotechnology Research Internship - R	3				X		X	X		X	HBMS 300 level
(Choose between HBMS 410,411,412,414,415)											
HSPH 332 - Intro to Biostatistics - R	3				X		X	X			AMAT 108
Elective - FE	3					X					
Upper level elective - FE	3					X	X				
Term Totals	**15**				**9**	**6**	**12**	**9**		**1**	**(X)**

Spring 4

Course Number & Title (& Type)	Number of Credits	GER Area	GE Credits	LAS	Major	Elective/Other	Upper Div	Upper Div Major	TPath	New Course	Co/Prerequisite
HBMS - Bio-Instrumentation Co-op Training Intern - R	3				X		X	X			
Elective - FE	3					X				X	Two HBMS 400 levels
Upper level elective - FE	3					X	X				
Upper level elective - FE	3					X	X				
Upper level elective - FE	3					X	X				
Term Totals	**15**				**3**	**12**	**12**	**3**		**1**	**(X)**

Program Total Summary

Total Credits	SUNY GER Areas	SUNY GER Credits	Liberal Arts & Sciences Credits	Major Credits	Elective and Other Credits	Upper Division Credits	Upper Division Major Credits	Total TPath Courses	New Courses
120	**9**	**44**	**69**	**75**	**20**	**45**	**31**		**7**

GER Area Summary

Basic Communication (BC)	**1**	**The Arts (AR)**	**1**	
Mathematics (M)	**2**	**American History (AH)**	**1**	
Natural Sciences (NS)	**5**	**Western Civilization (WC)**		
Social Sciences (SS)	**1**	**Other World Civilizations (OW)**	**1**	
Humanities (H)	**1**	**Foreign Language (FL)**	**1**	