ARIZONA STATE UNIVERSITY

PROPOSAL TO ESTABLISH A NEW UNDERGRADUATE CONCENTRATION

The completed and signed proposal should be submitted by the Dean's Office to: curriculumplanning@asu.edu.

Before academic units can advertise undergraduate concentrations or include them in their offerings as described in the university catalogs, they must be recommended for approval by the Senate Curriculum and Academic Programs Committee and approved by the Executive Vice President and Provost of the University.

Definition and minimum requirements:

A concentration is a formalized selection of courses within a major.

- A concentration requires a minimum of 15 semester hours of which at least 9 semester hours must be upper division. Specialized concentrations (e.g., BIS Concentrations) may have additional or different requirements.
- A concentration is offered by a single unit and is intended exclusively for students pursuing a particular major. If a concentration consists of courses from more than one college the approval of each college Dean is required.

College/School/Institute: College of Liberal Arts and Sciences

Department/Division/School: School of Life Sciences

Proposing Faculty Group (*if applicable*)**:**

If this is an official joint degree program? No, this is not a joint degree program

If "Yes" List all the additional college(s)/school(s)/institute(s) that will be involved in offering the degree program and providing the necessary resources. Note: All units offering this program must have collaborated in the proposal development and completed the appropriate unit and college/school approvals.

Existing Degree and Major under which this concentration will be established: BS Microbiology

Proposed Concentration Name: Biomedical Sciences

What is the first catalog year available for students to select on the undergraduate application for this this program? 2015-16

Delivery method: On-campus only (ground courses and/or iCourses)

Note: Once students elect a campus or On-line option, students will not be able to move back and forth between the on-campus and the ASU Online options. Approval from the Office of the Provost and Philip Regier (Executive Vice Provost and Dean) is required to offer programs through ASU Online.

Campus/Locations: indicate all locations where this program will be offered.

☐ Downtown Phoenix ☐ Polytechnic ☒ Tempe ☐ West Other:

Proposal Contact

Name:	Valerie Stout	**Title:**	Assoc. Professor
Phone number:	480-965-4617	**Email:**	vstout@asu.edu

DEAN APPROVAL(S)

This proposal has been approved by all necessary unit and College/School levels of review. I recommend implementation of the proposed organizational change.

College/School/Division Dean name: Paul LePore

Signature _____ **Date:** / /20

College/School/Division Dean name:
(if more than one college involved)

Signature _____ **Date:** / /20

Note: An electronic signature, an email from the dean or dean's designee, or a PDF of the signed signature page is acceptable.

ARIZONA STATE UNIVERSITY

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1. OVERVIEW

A. Provide a brief description of the new concentration (including the specific focus of the new concentration, relationship to other concentrations in this degree program, etc).

This Biomedical Sciences concentration within the Microbiology BS degree program in the School of Life Sciences will serve our undergraduate students who aim to pursue career interests in health professions or biomedical research. The proposed concentration curriculum aligns with the 2009 Report of the AAMC-HHMI Committee that identified scientific competencies that premedical students should demonstrate before entry into medical school. In addition to integrative course work in microbiology, interdisciplinary sciences, medical humanities, and communication, the concentration and curriculum emphasizes defined areas of knowledge, scientific concepts, and skills. Upon completion of the BS in Microbiology with a concentration in Biomedical Sciences, students will demonstrate knowledge of and ability to use basic principles of biology, biochemistry, chemistry, mathematics, physics and statistics needed for the application of the sciences to health and disease. Recognizing that medical schools, graduate schools, and health professions require the ability to deal with rapidly changing scientific knowledge, the Biomedical Sciences concentration will emphasize core concepts, competencies, and critical intellectual skills necessary to succeed. It will offer a robust liberal arts education that values, reinforces, and integrates analytical thinking, reasoning, quantitative assessment, and analysis of complex systems in biology.

B. Explain the unit's need for the new concentration (e.g., market demand, research base, direction of the discipline, and interdisciplinary considerations). How will the new concentration complement the existing degree program?

Approximately 70% of freshmen entering the School of Life Sciences identify themselves at "pre-med." However, a large fraction of pre-med students in Arizona choose to attend the University of Arizona because of the archaic perception that the med school in Tucson provides better technical training for pre-med students. Given the change in emphasis of the top medical schools and the MCAT from coursework to broad competencies, the Biomedical Sciences concentration under the BS in Microbiology is an excellent opportunity for ASU to break down an inaccurate stereotype. Many of the students in our Microbiology major plan to attend medical school or graduate school to study infectious disease, for example. We don't have a concentration in Microbiology that makes these career paths explicit. While most of the core courses in the Microbiology degree program are maintained, the concentration asks student to take more eukaryotic life sciences courses, as well as courses that relate more directly to human biology and society – consistent with the competencies identified in the 2009 Report of the AAMC-HHMI Committee on premedical education. The concentration will provide a more streamlined program of study within Microbiology to meet the changing demands on undergraduate education for future physicians. The new concentration emphasizes a strong and broad liberal education with a depth of knowledge and critical intellectual skills necessary for professional success. It will help those seeking premedical education or a career path in biomedical research to achieve analytical and scientific thinking skills needed to effectively address societal problems of health and disease.

2. Support and Impact

A. Provide a supporting letter from the chair of the academic unit verifying that the proposed concentration has received faculty approval through appropriate governance procedures in the unit and that the unit has the resources to support the concentration as presented in the proposal, without impacting core course resources.

See attached letter from Brian Smith, Director, School of Life Sciences

B. Identify other related ASU programs and outline how the new concentration will complement these existing ASU programs. (If applicable, statements of support from potentially-affected academic unit administrators need to be included with this proposal submission.)

Medical schools do not favor highly specialized technical degree programs, and they will admit qualified students from almost any degree program in CLAS. However, over the last 10 years, the majority of ASU students who have attended medical school have graduated from the School of Life Sciences. This conceentration has very little resemblance to any degree programs outside of the School of Life Sciences, although it will require a course in public health offered by SHESC.

C. Provide a supporting letter from each college/school dean from which individual courses, or the entire concentration, are taken.

3. Academic Curriculum and Requirements

A. List the knowledge, competencies, and skills (learning outcomes) students should have when they complete this proposed concentration. Examples of program learning outcomes can be found at (http://www.asu.edu/oue/assessment.html).

Learning outcomes are based on the core concepts and competencies identified in the 2009 Report of the AAMC-HHMI Committee on premedical education, and Vision and Change in Biology Undergraduate Education: A Call to Action. Graduates of the Microbiology- Biomedical Sciences concentration will be able to:

1) demonstrate knowledge of and ability to use basic principles in microbiology including concepts in molecular genetics, immunology, and cell biology, for the application of the sciences to health and disease

2) express practical understanding of the process of science, including how to read and critically examine current microbiology literature, develop hypotheses, design and conduct experiments, and quantitatively assess and analyze data

3) use written and oral communication skills to effectively communicate scientific concepts in medical microbiology to others with varying levels of scientific literacy

4) and demonstrate knowledge of and ability to use principles in chemistry, organic chemistry, biochemistry, physics, and mathematics to complex biological problems.

Biology educators are developing more sophisticated and comprehensive assessments, but initially, we will assess program success using the following criteria:

OUTCOME 1: Able to conduct a lab experiment, as evidenced by ability to:

- identify, describe, and apply the processes of science, including basic techniques such as the use of controls
- select and defend the appropriate scientific methodology either to test a given hypothesis and prediction or to answer a given question as it relates to a descriptive study
- distinguish between information that is recognized as well established (beyond reasonable doubt) versus information that is tentative
- evaluate whether data support a particular hypothesis
- evaluate the validity of hypotheses and predictions put forth by other researchers

Measure 1.1: Will create scenario with response questions (addressing above competencies) for BIO 281

Performance Criterion 1.1: 75% of students will master above competencies in BIO 281

Measure 1.2: Final lab assignment in BIO 282 (will address above competencies)

Performance Criterion 1.2: 75% of majors will master above competencies in BIO 282

OUTCOME 2: Will demonstrate general competency in genetics, as evidenced by ability to:

- Identify and describe major elements of the molecular anatomy of genes and genomes.
- Deduce information about genes, alleles, and gene functions from analysis of genetic crosses and patterns of inheritance.
- Deduce information about genes, alleles, and gene functions from analysis of genetic crosses and patterns of inheritance, as evidenced by ability to:
- Infer modes of trait inheritance from human pedigrees
- Evaluate hypotheses about genetic transmission by applying statistical tests to the results of crosses

Measure 1.1: Will create scenario with response questions (addressing above competencies) for BIO 340

Performance Criterion 1.1: 75% of students will master above competencies in BIO 340

OUTCOME 3: The MIC 401 research paper allows for a great deal of one on one interaction with faculty, since the paper is highly individualized for each student. MIC 302 is required for all Microbiology majors, and provides a strong foundation for students who enter this degree program. The combination of strong faculty/student interaction and mentoring has contributed to meeting the outcome goals for this program.

Measure 1.1: 15 page research paper in MIC 401

Performance Criteria 1.1: 85% of majors perform at a B or higher on the research paper

B. Provide the admissions criteria for the proposed concentration. If they are identical to the admission criteria for the existing major and degree program under which this concentration will be established, please note that here.

The admission criteria for the Biomedical Sciences proposed concentration is identical to the admissions criteria for the existing Microbiology degree program under which this concentration is established.

C. Provide the curricular structure for this concentration. Be specific in listing required courses and specify the total minimum number of hours required for the concentration.

Required Core Courses for the Degree/Major				
Prefix	**Number**	***Title***	***Is this a new Course?***	**Credit Hours**
BIO	189	Life Sciences Career Paths	No	1
BIO	281	Conceptual Approaches to Biology for Majors I	No	4
BIO	282	Conceptual Approaches to Biology for Majors II	No	4
BIO	340	General Genetics or MBB 347 Molecular Genetics		4
MIC	220	Biology of Microorganisms	No	3
MIC	206	Microbiology Laboratory	No	1
MIC	401**	Research Paper (final semester)	No	1
			Section sub-total:	18

**Changemaker request has been submitted to change prerequisites for MIC 401. MIC 302 is no longer a prerequisite. The prerequisite will be changed to senior status.

Required Concentration Courses				
Prefix	**Number**	***Title***	***Is this a new Course?***	**Credit Hours**
BIO	312	Bioethics	No	3
BIO	353	Cell Biology	No	3
MIC	420	Immunology: Molecular and Cellular Foundations	No	3
			Section sub-total:	9

Elective Concentration Courses (choose two courses)				
Prefix	**Number**	***Title***	***Is this a new Course?***	***Credit Hours***
BIO	360	Animal Physiology	No	3
HPS	331	History of Medicine	No	3
MIC	314	HIV/AIDS: Science, Behavior, and Society	No	3
MIC	481	Pathogenic Microbes	No	3
MIC	421	Experimental Immunology Laboratory	No	2
			Section sub-total:	5-6

Other Concentration Requirements *E.g.* – Capstone experience, *internship, clinical requirements, field studies, foreign language skills as applicable*	**Credit Hours**
Approved Electives (5 hrs minimum) Must take at least one from both categories. Must include at least one lab course or an approved BIO/MIC/MBB/PLB 484 Internship.) Core Electives not used to satisfy requirements above can be used for Approved Elective credit where appropriate.	
1) Microbes	

MIC 379 Medical Bacteriology	3
MIC 485 General Virology	3
MIC 494 Special Topics: Emerging Infectious Diseases	3
MIC 498 Pro-Seminar: Viral Pathogenesis and Host Defense	3
MIC 302 Advanced Bacteriology Laboratory	2
MIC 360 Bacterial Physiology	3
MIC 425 Advanced Immunology	3
MIC 441 Bacterial Genetics and	3
MIC 442 Bacterial Genetics Laboratory	1
BIO/MIC/MBB/PLB 495 Undergraduate Research	3
2) Biomedicine	
BCH 361 Advanced Principles of Biochemistry	3
BIO 343 Genetic Engineering and Society	4
BIO 345 Organic Evolution	3
BIO 351 Developmental Biology	3
BIO 451 Cell Biotechnology Laboratory	3
BIO 445 Introduction to Comparative Genomics	3
MIC/MBB 445 Techniques in Molecular Biology and	3
MIC/MBB 446 Techniques in Molecular Biology Laboratory	2
SSH 404 Medical Anthropology: Culture and Health	3
Section subtotal:	5-7

Related Area

Prefix	**Number**	***Title***	***Is this a new Course?***	***Credit Hours***
CHM	113	General Chemistry I (4)	No	4
CHM	116	General Chemistry II (4)	No	4
CHM	231	Elementary Organic Chemistry (3) and CHM 235 Elementary Organic Chemistry Laboratory (1)	No	4
BCH	361	Advanced Principles of Biochemistry (3) and BCH 367 Elementary Biochemistry Laboratory (1)	No	4
PHY	101	Introduction to Physics (4)	No	4
MAT	251	Calculus for Life Sciences (3)	No	(3)*
STP	231	Statistics for Life Science (3)	No	3

*MAT hours should count towards University hour requirement and not towards major hours.

	23
Total minimum credit hours required for concentration	**60-63**

D. A minimum residency requirement: How many hours of the concentration must be ASU credit?

15 hours

E. Provide a brief course description for each new course.

Note: All new required courses should be submitted in Curriculum Changemaker and ready for Provost's Office approval before this concentration is put on the CAPC agenda.

None

4. Administration and Resources

A. How will the proposed concentration be administered (including admissions, student advisement, retention, etc.)?

Same as our other majors and concentrations- Under the direction of Scot Schoenborn, the SoLS Advising Office will continue to support the advising needs of SoLS Microbiology students, including the Microbiology-Biomedical Sciences students. The SoLS Advising Office will work in conjunction with SoLS Undergraduate Programs to continue to increase retention in our existing and new concentrations. The admission requirements for this concentration will be the same as they are for all programs within the School of Life Sciences

B. What are enrollment projections for the next three years?

	1st Year	**2nd Year** (Yr 1 continuing + new entering)	**3rd Year** (Yr 1 & 2 continuing + new entering)
Number of Students (Headcount)	25	35	50

C. What are the resource implications for the proposed concentration, including any projected budget needs? Will new books, library holdings, equipment, laboratory space and/or personnel be required now or in the future? If multiple units/programs will collaborate in offering this concentration please discuss the resource contribution of each participating program. Letters of support must be included from all academic units that will commit resources to this concentration.

We expect to have increased enrollment in several large upper-division courses - Required Concentration Courses and Elective Concentration Courses. This will require us to allocate additional TAs to these courses. If possible, we will cover the additional TA lines with SOLS undergraduate program fees.

D. Please list the primary faculty participants regarding this proposed concentration. For interdisciplinary concentrations, please include the relevant names of faculty members from across the University.

Name	**Title**	**Area(s) of Specialization as they relate to proposed concentration**
Valerie Stout	Assoc. Prof	Molecular Microbiology
Shelley Haydel	Assoc. Prof	Pathogenic Microbes
Joseph Blattman	Asst. Prof	Immunology
Ben Hurlbut	Asst. Prof	Bioethics

5. Additional Materials

A. Prepare and attach a Major Map. Please use the "proposed map" function to create a Major Map in BAMM. This feature is explained in the training document available on help.asu.edu.

B. ***Complete and attach the Appendix document.***

C. Attach other information that will be useful to the review committees and the Office of the Provost.

APPENDIX
OPERATIONAL INFORMATION FOR UNDERGRADUATE CONCENTRATIONS

(This information is used to populate the Degree Search/catalog website.
Please consider the student audience in creating your text.)

Proposed Concentration Name: Microbiology (Biomedical Sciences)

1. **Program Description** (150 words maximum)
The biomedical sciences concentration serves students in the microbiology BS degree program who aim to pursue careers in health professions, medical microbiology or other areas of biomedical research. The curriculum aligns with the scientific competencies recommended for premed students in a report of the American Medical Colleges and the Howard Hughes Medical Institute Committee, and also reflected in the 2015 changes to the Medical College Admission Test (MCAT). Course work includes many of the courses in the microbiology major, including chemistry, biochemistry, math and physics, but some microbiology courses have been replaced with cell biology, animal physiology and courses that relate to human biology and society. The concentration emphasizes core concepts, competencies and critical intellectual skills necessary to succeed in medical school or biomedical research. The course work that students need to prepare for the MCAT or medical school admission are included in the concentration.

2. **Contact and Support Information**

Office Location (Building & Room): LSC 206

Campus Telephone Number: 480/727-6277

Program email address: sols.advising@asu.edu

Program website address: https://sols.asu.edu/

3. **Additional Program Description Information**

A. Additional program fee required for this program? Yes ☐ No ☒

B. Does this program have a second language requirement? Yes ☐ No ☒

4. **Delivery/Campus Information**

Delivery

☒ **On-campus only** (ground courses and/or iCourses) (check campus(es)/locations below)

☐ **ASU Online only** (all courses online)*

☐ **Both** on-campus **and** ☐ ASU Online*

** Note: Academic units must obtain prior approval from the Office of the Provost and Philip Regier (Executive Vice Provost and Dean) to offer programs through ASU Online.*

Campus(es) and/or Locations Check all locations where the program will be offered.

☐ Downtown ☐ Polytechnic
☒ Tempe ☐ West
☐ Other (please specify)

Operational information: Once students elect a campus or On-line option, students will not be able to move back and forth between the on-campus the ASU Online option.

5. **Career Opportunities & Concentrations** Provide a brief description of career opportunities available for this degree program with the proposed concentration.

   Upon completing the bachelor's in microbiology with a concentration in biomedical sciences, students will have completed the majority of prerequisite requirements and mastered many of the competencies valued by graduate programs in medical, dental, physician assistant, physical therapy and optometry. Additionally, graduates of this program will have a practical understanding of the process of science preparing them for a career in research. Students will have knowledge of foundational concepts in biological sciences, chemistry, physics and statistics, as well as the ability to understand and apply core microbiology concepts. This will prepare students to enter research in a number of areas including, but not limited to, cellular biology, immunology, bacteriology and virology.

6. **Additional Admission Requirements** If applicable list any admission requirements (freshman and/or transfer) that are higher than and/or in addition to the university minimum undergraduate admission requirements.)

   None

7. **Keywords** List all keywords used to search for this program. Keywords should be specific to the proposed program.

   Premed; pre-med; pre-medical; premedical; medicine; medical; med school; microbiology; microbes; immunology; bacteriology; virology;

8. **Advising Committee Code** List the existing advising committee code associated with this degree.
   BS in Microbiology (LAMICBS) are assigned to the Liberal Arts Life Sciences (UGASLS).

9. **Western Undergraduate Exchange (WUE) Eligible:**
   Has a request been submitted to the Provost by the Dean to consider this degree program as eligible for WUE?(Select Yes/No)
   Note: No action will be taken during the implementation process with regards to WUE until approval is received from the Provost.

10. **First Required Math Course** List the first math course required in the major map.
    STP 231

11. **Math Intensity**
    a. List the highest math required on the major map. (This will not appear on Degree Search.)

       MAT 251

    b. What is the math intensity as indicated by the highest math required on the major map? Math intensity categorization can be found here: https://catalog.asu.edu/mathintensity
       Moderate

12. **CIP codes**
    a. Identify CIP codes that should be displayed on Degree Search. CIP codes can be found at: http://www.onetonline.org/crosswalk/CIP/.

19-1022.00	29-1062.00
29-1021.00	29-1063.00
29-1051.00	29-1041.00
29-1067.00	
29-1071.00	

b. Are any specific career codes (SOC/ONET codes) to be omitted from the CIP codes selected above? (i.e. "Omit 25-10312.00 Engineering Teachers, Postsecondary from CIP code 14.0501 Bioengineering and Biomedical Engineering.")

13. Area(s) of Interest

A. Select one (1) primary Area of Interest from the list below that applies to this program.

- ☐ **Architecture, Construction & Design**
- ☐ **Artistic Expression & Performance**
- ☒ **Biological Sciences, Health & Wellness**
- ☐ **Business, Management & Economics**
- ☐ **Communication & Media**
- ☐ **Computing & Mathematics**
- ☐ **Education & Teaching**
- ☐ **Engineering & Technology**
- ☐ **Environmental Issues & Physical Science**
- ☐ **Interdisciplinary Studies**
- ☐ **Languages & Cultures**
- ☐ **Law & Justice**
- ☐ **Social Science, Policies & Issues**

B. Select any additional Areas of Interest that apply to this program from the list below.

- ☐ **Architecture, Construction & Design**
- ☐ **Artistic Expression & Performance**
- ☐ **Biological Sciences, Health & Wellness**
- ☐ **Business, Management & Economics**
- ☐ **Communication & Media**
- ☐ **Computing & Mathematics**
- ☐ **Education & Teaching**
- ☐ **Environmental Issues & Physical Science**
- ☐ **Engineering & Technology**
- ☐ **Interdisciplinary Studies**
- ☐ **Languages & Cultures**
- ☐ **Law & Justice**
- ☐ **Social Science, Policies & Issues**

ASU Arizona State University

2015 - 2016 Major Map
Microbiology - Biomedical Sciences, (Proposed)

Term 1 0 - 15 Credit Hours **Critical course signified by ◆**	**Hours**	**Minimum Grade**
ENG 101 or ENG 102: First-Year Composition OR ENG 105: Advanced First-Year Composition OR ENG 107 or ENG 108: First-Year Composition	3	C
◆ BIO 281: Conceptual Approaches to Biology for Majors I (SQ)	4	C
BIO 189: Life Sciences Career Paths	1	C
CHM 113: General Chemistry I (SQ)	4	C
STP 231: Statistics for Life Science (CS)	3	C
Term hours subtotal:	15	

Notes

- An SAT, ACT, Accuplacer, or TOEFL score determines placement into first-year composition courses.
- ASU Mathematics Placement Test score determines placement in Mathematics course.
- ASU 101 or College specific equivalent First Year Seminar required of all freshman students.

Term 2 16 - 32 Credit Hours **Critical course signified by ◆**	**Hours**	**Minimum Grade**
ENG 101 or ENG 102: First-Year Composition OR ENG 105: Advanced First-Year Composition OR ENG 107 or ENG 108: First-Year Composition	3	C
◆ BIO 282: Conceptual Approaches to Biology for Majors II	4	C
CHM 116: General Chemistry II (SQ)	4	C
MAT 251: Calculus for Life Sciences (MA)	3	C
Social-Behavioral Sciences (SB) AND Global Awareness (G)	3	
◆ Complete ENG 101 OR ENG 105 OR ENG 107 course(s).		
Term hours subtotal:	17	

Notes

Term 3 33 - 46 Credit Hours **Critical course signified by ◆**	**Hours**	**Minimum Grade**
BIO 340: General Genetics or MBB 347: Molecular Genetics: From Genes to Proteins	4	C
CHM 231: Elementary Organic Chemistry (SQ) AND CHM 235: Elementary Organic Chemistry Laboratory (SQ)	4	C
Humanities, Arts and Design (HU) AND Historical Awareness (H)	3	
Humanities, Arts and Design (HU)	3	
◆ Complete Mathematics (MA) requirement.		
Term hours subtotal:	14	

Notes

- Students planning to attend medical school will take CHM 233/237 this term instead of CHM 231/235

Term 4 47 - 63 Credit Hours **Critical course signified by ◆**	**Hours**	**Minimum Grade**
◆ MIC 220: Biology of Microorganisms AND MIC 206: Microbiology Laboratory (SG)	4	C
BIO 312: Bioethics (HU)	3	C
CLAS Science and Society Elective	3	C
Literacy and Critical Inquiry (L)	3	
Elective	4	
Term hours subtotal:	17	

Notes

- BIO 312 may be used to satisfy an upper division Science and Society credit for the College of Liberal Arts and Sciences.
- Students planning to attend medical school will take CHM 234/238 this term instead of an elective.

Term 5 64 - 78 Credit Hours **Necessary course signified by ☆**	**Hours**	**Minimum Grade**
☆ BIO 353: Cell Biology	3	C
BCH 361: Advanced Principles of Biochemistry AND BCH 367: Elementary Biochemistry Laboratory	4	C
PHY 101: Introduction to Physics (SQ)	4	C
Upper Division Elective	4	
Term hours subtotal:	15	

Notes

- Students planning to attend medical school will take BCH 461 this term instead of BCH 361/367a1.
- Students planning to attend medical school will take PHY 111/113 this term instead of PHY 101.

- MIC 360 or MIC 441 may be taken for the upper division elective in this term to facilitate registration for MIC 481 in term 6.

Term 6 79 - 94 Credit Hours **Necessary course signified by**	**Hours**	**Minimum Grade**	**Notes**
Complete 2 courses: BIO 360: Animal Physiology OR HPS 331: History of Medicine (H) OR MIC 314: HIV/AIDS: Science, Behavior, and Society OR MIC 481: Pathogenic Microbes OR MIC 421: Experimental Immunology	5	C	• Students planning to attend medical school will take PHY 112/114 this term instead of an elective. • Students planning to attend medical school will take BCH 462/467 this term instead of an upper division elective. • Courses from the Microbes and Biomedicine groups must include at least one course from each category and at least one (1) lab course.
Microbes or Biomedicine course	4-2	C	
Elective	3		
Upper Division Elective	4		
Term hours subtotal:	16-14		

Term 7 95 - 108 Credit Hours **Necessary course signified by**	**Hours**	**Minimum Grade**	**Notes**
MIC 420: Immunology: Molecular and Cellular Foundations	3	C	• Courses from the Microbes and Biomedicine groups must include one (1) lab course.
Microbes or Biomedicine course	2-4	C	
Upper Division Literacy and Critical Inquiry (L)	3		
Upper Division Humanities, Arts and Design (HU) OR Upper Division Social-Behavioral Sciences (SB)	3		
Upper Division Elective	3		
Term hours subtotal:	14-16		

Term 8 109 - 120 Credit Hours **Necessary course signified by**	**Hours**	**Minimum Grade**	**Notes**
MIC 401: Research Paper (L)	1	C	
Social-Behavioral Sciences (SB) AND Cultural Diversity in the U.S. (C)	3		
Complete 2 courses: Upper Division Elective	5		
Elective	3		
Term hours subtotal:	12		

- All students pursuing a B.S. or B.S.P. degree in the College of Liberal Arts and Sciences must complete two courses from the Science and Society list found at https://clas.asu.edu/advising-and-academic-services/science-and-society. At least one of the two courses must be upper division. Students must earn a C or better in the courses, and no more than one of the two can also be used to simultaneously fill a requirement of the major, minor or related area. Science and Society courses cannot also be used to fill the general studies HU, SB, SQ or SG requirements.

Microbes	Biomedicine
MIC 379: Medical Bacteriology	BCH 361: Advanced Principles of Biochemistry
MIC 485: General Virology	BIO 343: Genetic Engineering and Society (L)
MIC 494: Emerging Infectious Diseases	BIO 345: Organic Evolution
MIC 498: Viral Pathogenesis/Host Def	BIO 351: Developmental Biology
MIC 302: Advanced Bacteriology Laboratory (L)	BIO 451: Cell Biotechnology Laboratory
MIC 360: Bacterial Physiology	MIC 445: Techniques in Molecular Biology/Genetics or MBB 445: Techniques in Molecular Biology/Genetics
MIC 425: Advanced Immunology	MIC 446: Techniques in Molecular Biology/Genetics Lab or MBB 446: Techniques in Molecular Biology/Genetics Lab
MIC 441: Bacterial Genetics	SSH 404: Medical Anthropology: Culture and Health (SB & C)
MIC 442: Bacterial Genetics Laboratory	
BIO 495: Undergraduate Research or MIC 495: Undergraduate Research or MBB 495: Undergraduate Research or PLB 495: Undergraduate Research	

Notes:

- Please keep in mind that the applicability of a specific transfer course toward an ASU degree program depends on the requirements of the department, division, college or school in which you are enrolled at ASU. Transfer agreements that guarantee the completion of university level requirements do not necessarily meet college and major requirements. Please consult with an advisor for more information.

Total Hours: 120
Upper Division Hours: 45 minimum
Major GPA: 2.00 minimum
Cumulative GPA: 2.00 minimum
Total hrs at ASU: 30 minimum
Hrs Resident Credit for Academic Recognition: 56 minimum
Total Community College Hrs: 64 maximum

General University Requirements Legend

General Studies Core Requirements:

- Literacy and Critical Inquiry (L)
- Mathematical Studies (MA)
- Computer/Statistics/Quantitative Applications (CS)
- Humanities, Arts and Design (HU)
- Social-Behavioral Sciences (SB)
- Natural Science - Quantitative (SQ)
- Natural Science - General (SG)

General Studies Awareness Requirements:

- Cultural Diversity in the U.S. (C)
- Global Awareness (G)
- Historical Awareness (H)

First-Year Composition

General Studies designations listed on the major map are current for the 2015 - 2016 academic year.

Julie Ramsden

From: Paul LePore <Paul.Lepore@asu.edu>
Sent: Friday, April 11, 2014 2:03 PM
To: curriculumplanning@asu.edu
Cc: Jenny Smith; Paul LePore
Subject: Biomedical Sciences Concentrations within the BS in Microbiology & BS in Biological Sciences
Attachments: Medical Microbiology Concentration_MO.docx.doc; Microbiology Curriculum Structure.docx; Microbiology- Biological Sciences Description 150 words.docx; Major Map Biomedical Sciences - BS Microbiology.pdf; Letters of support - Micro.pdf; Biomedical Sciences Concentration_Final.doc; Biological Sciences Related Area.docx; Biological Sciences 150 word description.docx; Major Map Biomedical Sciences - BS Biological Sciences.pdf; Letters of Support - Bilogical Sciences Con..pdf

Please accept the attached proposals to establish two new undergraduate concentrations in Biomedical Sciences.

Thank you!

Paul

PAUL C. LEPORE, Ph.D.
Associate Dean
College of Liberal Arts and Sciences
Foundation Building, Suite 110
Arizona State University | P.O. Box 876605 | Tempe, Arizona 85287-6605
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SCHOOL OF Life Sciences
ARIZONA STATE UNIVERSITY

TO: CLAS Curriculum Committee

FROM: Brian H. Smith, Director
School of Life Sciences

DATE: March 13, 2014

SUBJECT: Biomedical Sciences Concentration

The concentration in Biomedical Sciences within the Microbiology degree program was developed and approved by the School of Life Sciences Undergraduate Programs Committee. The proposed concentration will integrate well with our existing programs and will require few additional teaching resources. The concentration will benefit our students and has my support.

Sincerely,

Brian Smith
School Director and Professor
School of Life Sciences
Arizona State University

College of Liberal Arts and Sciences
PO Box 874501 Tempe, AZ 85287-4501
(480) 965-0803 Fax: (480) 965-6899

Physics Confirmation

Katelyn Cooper

To: Scot Schoenborn
Subject: RE: Impact statement-new concentration in SOLS

From: Ixchell Paape <Ixchell.Paape@asu.edu>
Date: March 13, 2014 at 12:35:21 PM MST
To: Scot Schoenborn <Scot.Schoenborn@asu.edu>
Cc: Miles Orchinik <m.orchinik@asu.edu>, Morgan Texeira <Texeira@asu.edu>, Stuart Lindsay <STUART.LINDSAY@asu.edu>
Subject: RE: Impact statement-new concentration in SOLS

Hello Scot -

No objections from physics. Thank you for keeping us in the loop.

From: Scot Schoenborn
Sent: Thursday, March 13, 2014 8:44 AM
To: Ixchell Paape
Cc: Miles Orchinik
Subject: Impact statement-new concentration in SOLS

H Ixchell-

The School of Life Sciences is looking to propose two new concentrations for Fall 2015: Medical Microbiology and Biological Sciences: Biomedical Sciences.

I have attached the two proposals and wanted to see if you had any objections. Basically, these concentrations would follow similar models in requiring either one semester (PHY 101) or 1 year (PHY 111/113 and PHY 112/114) of general physics.

CLAS requested we run this by you to make sure you do not object. At this point, it is hard to say if this will increase our overall enrollment or simply shift student preferences in concentrations within SOLS.

With that said, any objections?

Scot Schoenborn
Associate Director of Academic Services
School of Life Sciences
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School of Human Evolution and Social Change Confirmation

Scot Schoenborn

From: Scot Schoenborn
Sent: Tuesday, March 11, 2014 12:52 PM
To: Alissa Ruth
Cc: Miles Orchinik; Katelyn Cooper; Kelly Knudson; Alexandra Brewis Slade
Subject: RE: New concentration in SOLS

Thanks for your feedback Alissa-

Yes, I can make the changes you request.

Sincerely,

Scot Schoenborn
Associate Director of Academic Services
School of Life Sciences
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From: Alissa Ruth
Sent: Tuesday, March 11, 2014 11:13 AM
To: Scot Schoenborn
Cc: Miles Orchinik; Katelyn Cooper; Kelly Knudson; Alexandra Brewis Slade
Subject: RE: New concentration in SOLS

Hi Scott,
Thanks for contacting us, I am copying Kelly Knudson who is working with me on curriculum now. All these courses look good, and we may be adding more onto the books in the next year or two. Please be aware that these classes aren't always offered during the regular semester, although we do tend to offer many of them online in the summer, and on our summer study abroad programs. Lastly, two things: 1) can you be sure to list the x-lists of the SSH courses that are ASB and ASM (bc these are more recognized and we offer more seats in these); 2) you have SSH 404 listed twice.

Best,
Alissa

Here is the list of courses with x-lists:
ASB 345 Disease and Human Evolution 3
ASB 355 Traditional Medicine and Healing 3
ASB 462/SSH 404 Medical Anthropology: Culture and Health 3
SSH 301 (crosslisted as ASB301 and HST 301) Global History of Health 3
ASM 401/SSH 401 Health and Human Biology 3
ASB 452/ SSH 402 Community Partnerships for Global Health 3
SSH 403 (crosslisted as ASB443) Cross Cultural Studies in Global Health 3

Here is the list of courses with x-lists:
ASB 345 Disease and Human Evolution 3
ASB 355 Traditional Medicine and Healing 3
ASB 462/SSH 404 Medical Anthropology: Culture and Health 3
SSH 301 (crosslisted as ASB301 and HST 301) Global History of Health 3
ASM 401/SSH 401 Health and Human Biology 3
ASB 452/ SSH 402 Community Partnerships for Global Health 3
SSH 403 (crosslisted as ASB443) Cross Cultural Studies in Global Health 3

ALISSA RUTH
Director of Student and Academic Services
School of Human Evolution and Social Change
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480.965.4620 | Fax: 480.965.7671 | e-mail: alissa.ruth@asu.edu |webpage: www.shesc.asu.edu

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From: Scot Schoenborn
Sent: Tuesday, March 11, 2014 10:39 AM
To: Alissa Ruth
Cc: Miles Orchinik; Katelyn Cooper
Subject: New concentration in SOLS

Hi Alissa-

We are sending a proposal for a new concentration in SOLS, Biological Sciences: Biomedical Sciences. We would like to list some of your coursework as options for our students

Students must pick one course from the following list (which includes some of your courses)

Chemistry & Biochemistry statement of support

Jenny Smith

From: Scot Schoenborn
Sent: Monday, March 24, 2014 8:35 AM
To: Jenny Smith
Cc: P.F. Lengel; Miles Orchinik; Katelyn Cooper
Subject: FW: Impact statement-new concentration in SOLS

Hi Jenny-

We heard back from Chemistry regarding our intention to create two new concentrations(below). Would you like me to scan this and send to you, or is this sufficient?

Scot Schoenborn
Associate Director of Academic Services
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From: Wilson Francisco
Sent: Sunday, March 23, 2014 4:15 PM
To: Scot Schoenborn
Cc: Miles Orchinik
Subject: Re: Impact statement-new concentration in SOLS

Dear Miles and Scot,

After careful consideration, the Department of Chemistry and Biochemistry is pleased to support the implementation of the two new concentrations (Medical Microbiology and Biological Sciences: Biomedical Sciences) by the School of Life Sciences. The Department of Chemistry and Biochemistry will be able to accommodate any increase in enrollment in our chemistry (e.g. CHM 113, 116, 231, 235, 233, 234, 237, 238) and biochemistry (BCH 361 & 367) courses that results from the implementation of these two programs.

Best regards,
Wilson

Wilson A. Francisco, PhD
Associate Professor and Associate Chair