APPROVED BY SENATE
02/10/2020

Date Submitted: 01/16/20 3:42 pm

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Last approved: 02/22/19 2:04 pm

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Changes proposed by: Kelly Ritter

Catalog Pages Using this Program	Computer Science & Astronomy, BSLAS

In Workflow

1. **U Program Review**
2. **1430 Head**
3. **1434 Head**
4. **KP Dean**
5. **KV Dean**
6. **University Librarian**
7. **Provost**
8. **Senate EPC**
9. Senate
10. U Senate Conf
11. Board of Trustees
12. IBHE
13. DMI

Approval Path

1. 01/17/20 10:10 am
   Deb Forgacs (dforgacs):
   Approved for U Program Review
2. 01/17/20 7:28 pm
   Bryan C. Dunne (bdunne):
   Approved for 1430 Head
3. 01/18/20 3:05 pm
   Elsa Gunter (egunter):
   Approved for 1434 Head
4. 01/21/20 8:51 am
   Candy Deaville (candyd):
   Approved for KP Dean
5. 01/21/20 9:59 am
   Kelly Ritter (ritterk):

Approved for KV Dean
6. 01/21/20 10:19 am
John Wilkin (jpwilkin): Approved for University Librarian
7. 01/21/20 10:45 am
Kathy Martensen (kmartens): Approved for Provost

History

1. Feb 22, 2019 by Deb Forgacs (dforgacs)

Proposal Type

Proposal Type:
Major (ex. Special Education)

This proposal is for a:
Revision

Proposal Title:

if this proposal is one piece of a multi-element change please include the other impacted programs here. *example: A BS revision with multiple concentration revisions*

Revise the BSLAS in Computer Science & Astronomy, College of Liberal Arts and Sciences ~~migration~~

EP Control Number	**EP.20.90**
Official Program Name	Computer Science & Astronomy, BSLAS
Effective Catalog Term	Fall 2020
Sponsor College	Liberal Arts & Sciences

Sponsor Department	Astronomy
Sponsor Name	**Tony Wong**
Sponsor Email	**wongt@illinois.edu**
College Contact	**Kelly Ritter**
College Contact Email	**ritterk@illinois.edu**

Program Description and Justification

Justification for proposal change:

The CS+Astronomy major currently requires 24 hours of astronomy coursework, of which 12 are dedicated to math and physics foundations (PHYS 211, 212, MATH 241) and 12 are dedicated to intermediate and advanced astronomy courses at the 300- and 400-level. The astrophysics foundation course, ASTR 210, is conspicuously absent from the required courses list, although ASTR 210 is the foundational course for Astronomy majors. We propose to rectify this inconsistency by including ASTR 210 as a requirement for CS+Astronomy. We have recently added a new Computing in Astronomy course (ASTR 310) that supplements and builds upon ASTR 210, which we will also require as part of the advanced hours. We will also require that students take two courses focused on technical depth in Astronomy by providing a list to choose from (ASTR 404, 405, 406, 414). The total number of hours for the Astronomy side of the CS + Astronomy degree will increase from 24 to 27, still in line with other CS+X majors, as several other CS+X majors (e.g., Crop Sciences, Music, Philosophy) also require more than 24 hours in the non-CS discipline.

The initial choice not to make ASTR 210 a requirement for the major was based on a CS+X template that only allowed 12 hours of 100- and 200-level courses and 12 hours of 300- and 400-level courses in the non-CS discipline. The necessity of requiring the math and physics foundations for astronomy that are not provided on the CS side meant that ASTR 210 could not be included in this list. At the same time, ASTR 210 is the foundational survey course for astronomy majors, and satisfactory completion of it is needed to demonstrate readiness to switch into the CS+Astronomy major. This has made it an effective but not formal requirement. Meanwhile, we have found that students taking the more advanced astronomy courses are at a disadvantage not having taken ASTR 210, and so we are considering making 210 a prerequisite for our 400-level courses. Going forward, we would like to ensure that all of our majors (both Astronomy and CS+Astronomy) have taken ASTR 210, which is offered every semester and has experienced recent but manageable enrollment growth.

The new constraints on the advanced hours are requested for the following reasons. (1) We have a new course, ASTR 310, which is an introduction to the use of computers in astrophysics research, and thus a perfect way for CS+Astronomy students to get to know each other and apply their skills. We would like all CS+Astronomy majors to take this course. (2) We are concerned about the possibility of CS+Astronomy majors avoiding the 400-level Advanced Astronomy core courses (ASTR 404, 405, 406, 414). These are our "bread and butter" technical courses (regular Astronomy majors must take at least three), are offered every year, and are being enhanced with more data analysis work that will make them very well suited for CS+Astronomy students. Given the constraints on their time, we would like CS+Astronomy majors to take at least two, so they have in-depth knowledge of at least two aspects of modern astronomy. ASTR 330 and 350 are much less technical and often taken by non-scientists; at most one of these should count toward the CS+Astronomy major. ASTR 390 is independent study and, while valuable, should not be viewed as a substitute for the 400-level courses. Currently a loophole allows up to 8 hours of 390 to count towards the 12 hours of advanced astronomy in CS+Astronomy. ~~migration~~

Corresponding Degree	BSLAS Bachelor of Science in Liberal Arts and Sciences

Is this program interdisciplinary?

Yes

Interdisciplinary Colleges and Departments (list other colleges/departments which are involved other than the sponsor chose above)

Please describe the oversight/governance for this program, e.g., traditional departmental/college governance. Inclusion of/roles of elected faculty committees? Inclusion of/roles of any advisory committees.

This is a BSLAS degree housed in the College of Liberal Arts and Sciences, but approximately half the required hours come from Computer Science courses, as is the case with all CS+X degrees on campus.

College	Grainger College of Engineering
Department	Computer Science

Do you need to add an additional interdisciplinary relationship?

No

Academic Level	Undergraduate
Will you admit to the concentration directly?	**Yes**
Is a concentration required for graduation?	**No**

CIP Code 110199 - Computer and Information Sciences, Other.

Is This a Teacher Certification Program?
No

Will specialized accreditation be sought for this program?

No

Admission Requirements

Desired
Admissions Term

Provide a brief narrative description of the admission requirements for this program. Where relevant, include information about licensure requirements, student background checks, GRE and TOEFL scores, and admission requirements for transfer students.

Describe how critical academic functions such as admissions and student advising are managed.

Enrollment

Describe how this revision will impact enrollment and degrees awarded.

No impact is expected on CS enrollments. Increasing the required Astronomy hours in CS+ Astronomy was discussed with CS representatives and the response was positive. We attach here a letter of acknowledgment representing that discussion. ~~migration~~

Estimated Annual Number of Degrees Awarded

Year One Estimate	5th Year Estimate (or when fully implemented)

What is the matriculation term for this program?
Fall

Delivery Method

Is this program available on No

campus and online?

This program is available:
On Campus

Budget

Are there budgetary implications for this revision? No

Will the program or revision require staffing (faculty, advisors, etc.) beyond what is currently available?
No

Additional Budget Information

Attach File(s)

Resource Implications

Facilities

Will the program require new or additional facilities or significant improvements to already existing facilities?
No

Technology

Will the program need additional technology beyond what is currently available for the unit?
No

Non-Technical Resources

Will the program require additional supplies, services or equipment (non-technical)?

No

Resources

Faculty Resources

Please address the impact on faculty resources including any changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc. Describe how the unit will support student advising, including job placement and/or admission to advanced studies.

Since most CS + Astronomy majors already take ASTR 210, the impact on class size will be modest, and no impact on faculty teaching load or student advising is expected. Although there has been significant growth in enrollment in ASTR 210, it has been managed with additional homework graders and the use of Course Management systems. Since the plurality of students in the course are Physics majors and CS+Astronomy existing majors, increasing enrollment will not strain resources.

Increased enrollment in the 400-level Astronomy courses is expected, at the expense of 300-level Astronomy courses (but those are typically much larger). The expected growth is in line with the existing growth of the Astronomy major overall and of Physics majors who also take Astronomy courses. ~~migration~~

Library Resources

Describe your proposal's impact on the University Library's resources, collections, and services. If necessary please consult with the appropriate disciplinary specialist within the University Library.

No impact expected. ~~migration~~

Instructional Resources

Will there be any reduction in other course offerings, programs or concentrations by your department as a result of this new program/proposed change?

No

Does this new program/proposed change result in the replacement of another program?

No

Does the program include other courses/subjects impacted by the creation/revision of this program?

No

Financial Resources

How does the unit intend to financially support this proposal?

No financial impact is anticipated.

Will the unit need to seek campus or other external resources?

No

Attach letters of support

csletter.pdf

Will an existing tuition rate be used or continue to be used for this program?

Yes

Program Regulation and Assessment

Briefly describe the plan to assess and improve student learning, including the program's learning objectives; when, how, and where these learning objectives will be assessed; what metrics will be used to signify student's achievement of the stated learning objectives; and the process to ensure assessment results are used to improve student learning. (Describe how the program is aligned with or meets licensure, certification, and/or entitlement requirements, if applicable).

Is the career/profession for graduates of this program regulated by the State of Illinois?

No

Program of Study

"Baccalaureate degree requires at least 120 semester credit hours or 180 quarter credit hours and at least 40 semester credit hours (60 quarter credit hours) in upper division courses" (source: https://www.ibhe.org/assets/files/PrivateAdminRules2017.pdf). For proposals for new bachelor's degrees, if this minimum is not explicitly met by specifically-required 300- and/or 400-level courses, please provide information on how the upper-division hours requirement will be satisfied.

All proposals must attach the new or revised version of the Academic Catalog program of study entry. Contact your college office if you have questions.

Revised programs **CS+Astronomy comparative table.docx**

Attach a side-by-side comparison with the existing program AND, if the revision references or adds "chose-from" lists of courses students can select from to fulfill requirements, a listing of these courses, including the course rubric, number, title, and number of credit hours.

Catalog Page Text

Catalog Page Text: Description of program for the catalog page. This is not official content, it is used to help build the catalog pages for the program. Can be edited in the catalog by the college or department.

Statement for Programs of Study Catalog

General education: Students must complete the Campus General Education requirements including the campus general education language requirement.

Minimum required major and supporting course work: Normally equates to **68-71** ~~66~~ hours. Twelve hours of 300- and 400-level in the major must be taken on this campus.

A Major Plan of Study form must be completed and submitted to the LAS Student Affairs office by the beginning of the fifth semester (60-75 hours). Please see the Computer Science advisor as well as the Astronomy advisor.

Minimum hours required for graduation: 120 hours.

Course List

Code	Title	Hours
Required Computer Science Coursework		32-33
CS 100	Freshman Orientation (recommended) 1	0-1
CS 125	Intro to Computer Science	4
CS 126	Software Design Studio	3
CS 173	Discrete Structures	3
CS 225	Data Structures	4
CS 233	Computer Architecture	4
CS 241	System Programming	4
Choose one of the following:		3
STAT 200	Statistical Analysis	
STAT 212	Biostatistics	
CS 361	Probability & Statistics for Computer Science	
CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3
Mathematics (may also fulfill the General Education Quantitative Reasoning I and II requirements)		9-10
MATH 221	Calculus I	4-5
or MATH 220	Calculus	
MATH 225	Introductory Matrix Theory	2
MATH 231	Calculus II	3
Required Astronomy Coursework - Minimum of 27 Hours		
~~Physics and Mathematics Courses 2~~		
Physics, Mathematics, and Astronomy Foundations		**15**
PHYS 211	University Physics: Mechanics	4
PHYS 212	University Physics: Elec & Mag	4
MATH 241	Calculus III	4
~~Intermediate and Advanced Astronomy Courses~~		~~12~~
~~Select 12 hours from the following. Taking one of the computation-intensive ASTR 496 Seminar in Astronomy sections is strongly recommended~~		
~~ASTR 330~~	~~Extraterrestrial Life~~	
~~ASTR 350~~	~~The Big Bang, Black Holes, and the End of the Universe~~	
~~ASTR 390~~	~~Individual Study~~	

Code	Title	Hours
ASTR 210	**Introduction to Astrophysics**	**3**
Advanced Astronomy Courses		**12-13**
ASTR 310	**Computing in Astronomy**	**3**
Select 2 courses from the following list:		**6-7**
ASTR 404	Stellar Astrophysics	
ASTR 405	Planetary Systems	
ASTR 406	Galaxies and the Universe	
ASTR 414	Astronomical Techniques	
~~ASTR 496~~	~~Seminar in Astronomy (check with advisor for appropriate topics)~~	
Additional ASTR course(s) at the 300 level or higher (2-3 hours) Minimum 12 total advanced ASTR hours required		**2-3**

1CS 100 is an orientation course aimed at first-year students, so students who declare the major after the freshman year are not required to complete it.

~~2 ASTR 210 is highly recommended.~~

EP Documentation

Attach Rollback/Approval Notices

DMI Documentation

Attach Final Approval Notices

Banner/Codebook Name

BSLAS: Comp Sci & Astr-UIUC

Program Code: 10KV5349BSLA

Minor Code	Conc Code	Degree Code	BSLAS Major Code
5349			

Senate Approval Date

Senate Conference Approval Date

BOT Approval Date

IBHE Approval Date

Effective Date:

Attached Document

Justification for this request

Program Reviewer Comments

Key: 282

Appendix A:
Comparative Table of Revisions

Current Requirements:	Hours	Revised Requirements:	Hours
Required Computer Science Coursework		Required Computer Science Coursework	
CS 100 Freshman Orientation (recommended) [1]	0-1	CS 100 Freshman Orientation (recommended) [1]	0-1
CS 125 Intro to Computer Science	4	CS 125 Intro to Computer Science	4
CS 126 Software Design Studio	3	CS 126 Software Design Studio	3
CS 173 Discrete Structures	3	CS 173 Discrete Structures	3
CS 225 Data Structures	4	CS 225 Data Structures	4
CS 233 Computer Architecture	4	CS 233 Computer Architecture	4
CS 241 System Programming	4	CS 241 System Programming	4
Choose one of the following:	3	Choose one of the following:	3
STAT 200 Statistical Analysis STAT 212 Biostatistics CS 361 Probability & Statistics for Computer Science		STAT 200 Statistical Analysis STAT 212 Biostatistics CS 361 Probability & Statistics for Computer Science	
CS 374 Introduction to Algorithms & Models of Computation	4	CS 374 Introduction to Algorithms & Models of Computation	4
CS 421 Programming Languages & Compilers	3	CS 421 Programming Languages & Compilers	3
Mathematics (may also fulfill the General Education Quantitative Reasoning I and II requirements)		Mathematics (may also fulfill the General Education Quantitative Reasoning I and II requirements)	
MATH 221 Calculus I Or MATH 220 Calculus	4-5	MATH 221 Calculus I Or MATH 220 Calculus	4-5
MATH 225 Introductory Matrix Theory	2	MATH 225 Introductory Matrix Theory	2
MATH 231 Calculus II	3	MATH 231 Calculus II	3
Required Astronomy Coursework- Minimum 24 hours		Required Astronomy Coursework- Minimum 27 hours	
Physics & Mathematics Courses [2]		***Physics, Mathematics, & Astronomy Foundations***	

PHYS 211 University Physics: Mechanics	4	PHYS 211 University Physics: Mechanics	4
PHYS 212 University Physics: Elec & Mag	4	PHYS 212 University Physics: Elec & Mag	4
MATH 241 Calculus III	4	MATH 241 Calculus III	4
		ASTR 210 Introduction to Astrophysics	3
Intermediate & Advanced Astronomy Courses- 12 hours		**Intermediate and Advanced Astronomy Courses- 12 hours**	
Select 12 hours from the following. Taking one of the computation-intensive ASTR 496 Seminar in Astronomy sections is strongly recommended			
ASTR 330 Extraterrestrial Life ASTR 350 The Big Bang, Black Holes, and the End of the Universe ASTR 390 Individual Study ASTR 404 Stellar Astrophysics ASTR 405 Planetary Systems ASTR 406 Galaxies and the Universe ASTR 414 Astronomical Techniques ASTR 496 Seminar in Astronomy (check with advisor for appropriate topics)			
		ASTR 310 Computing in Astronomy	3
		Select two (2) courses from the following list:	6-7
		ASTR 404 Stellar Astrophysics	
		ASTR 405 Planetary Systems	
		ASTR 406 Galaxies and the Universe	
		ASTR 414 Astronomical Techniques	
		Additional ASTR course(s) at the 300 level or higher	2-3 Hours

Total Required Astronomy Coursework	24 Hours	***Total Required Astronomy Coursework***	27 Hours
1 CS 100 is an orientation course aimed at first-year students, so students who declare the major after the freshman year are not required to complete it. 2 ASTR 210 is highly recommended.		1 CS 100 is an orientation course aimed at first-year students, so students who declare the major after the freshman year are not required to complete it.	

From: "Gunter, Elsa" <egunter@illinois.edu>
Subject: Re: CS+Astronomy revision
Date: April 18, 2019 at 1:12:22 AM CDT
To: "Wong, Tony" <wongt@illinois.edu>

Dear Tony,

I have reviewed the proposed changes to the CS+ ASTR degree program and found them to be sensible and an improvement, and as such I approve them, both the addition of ASTR 210 at the beginning of the program to give the students a more solid foundation, and the revision to the category "Intermediate and Advanced Astronomy" to make it more focused and more tightly fitting the purpose of the CS+ASTR degree.

---Elsa

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Elsa L Gunter
Research Professor
Director of Undergraduate Programs
Department of Computer Science
University of Illinois at Urbana - Champaign