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| For Academic Affairs and Research Use Only | |
| CIP Code: |  |
| Degree Code: |  |

**New Course Proposal Form**

**[ ] Undergraduate Curriculum Council**

**[X] Graduate Council**

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| **[X] New Course or [ ]Experimental Course (1-time offering) (Check one box)** |

Signed paper copies of proposals submitted for consideration are no longer required. Please type approver name and enter date of approval.

Email completed proposals to [curriculum@astate.edu](mailto:curriculum@astate.edu) for inclusion in curriculum committee agenda.

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| Edward Hammerand 7/24/2017 **Department Curriculum Committee Chair** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **COPE Chair (if applicable)** |
| Hung-Chi Su 7/24/2017 **Department Chair:** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **Head of Unit (If applicable)** |
| David F. Gilmore 10/6/2017 **College Curriculum Committee Chair** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **Undergraduate Curriculum Council Chair** |
| Anne A. Grippo 10/6/2017 **College Dean** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **Graduate Curriculum Committee Chair** |
| |  |  | | --- | --- | | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Enter date |   **General Education Committee Chair (If applicable)** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **Vice Chancellor for Academic Affairs** |

1. Contact Person (Name, Email Address, Phone Number)

*Dr. Hung-Chi Su,* [*suh@astate.edu*](mailto:suh@astate.edu)*, 870-680-8119*

2. Proposed Starting Term and Bulletin Year

*Fall, 2018; 2018-2019 graduate bulletin*

3. Proposed Course Prefix and Number (Confirm that number chosen has not been used before. For variable credit courses, indicate variable range. *Proposed number for experimental course is 9*. )

*CSED 5731*

4. Course Title – if title is more than 30 characters (including spaces), provide short title to be used on transcripts. Title cannot have any symbols (e.g. slash, colon, semi-colon, apostrophe, dash, and parenthesis). Please indicate if this course will have variable titles (e.g. independent study, thesis, special topics).

*Principles of Abstract Structures*

5. Brief course description (40 words or fewer) as it should appear in the bulletin.

*Foundational computer science concepts, including algorithm complexity and structures such as sets, trees, and graphs, with an emphasis on pedagogy in the secondary school.*

6. Prerequisites and major restrictions. (Indicate all prerequisites. If this course is restricted to a specific major, which major. If a student does not have the prerequisites or does not have the appropriate major, the student will not be allowed to register).

1. **No** Are there any prerequisites?
   1. If yes, which ones?

Enter text...

* 1. Why or why not?

1. **No** Is this course restricted to a specific major?
   1. If yes, which major? Enter text...

7. Course frequency(e.g. Fall, Spring, Summer). *Not applicable to Graduate courses.*

*Not applicable*

8. Will this course be lecture only, lab only, lecture and lab, activity, dissertation, experiential learning, independent study, internship, performance, practicum, recitation, seminar, special problems, special topics, studio, student exchange, occupational learning credit, or course for fee purpose only (e.g. an exam)? Please choose one.

*Lecture only*

9. What is the grade type (i.e. standard letter, credit/no credit, pass/fail, no grade, developmental, or other [please elaborate])

*Standard letter*

10. **No** Is this course dual listed (undergraduate/graduate)?

11. **No** Is this course cross listed?

*(If it is, all course entries must be identical including course descriptions. Submit appropriate documentation for requested changes. It is important to check the course description of an existing course when adding a new cross listed course.)*

**11.1** – If yes, please list the prefix and course number of cross listed course.

Enter text...

**11.2** – **Yes / No** Are these courses offered for equivalent credit?

Please explain. Enter text...

12. **Yes** Is this course in support of a new program?

a. If yes, what program?

*Master of Science in Education in Computer Science;   
Graduate Certificate in Computer Science Education*

13. **No** Does this course replace a course being deleted?

a. If yes, what course?

Enter text...

14. **No** Will this course be equivalent to a deleted course?

a. If yes, which course?

Enter text...

15. **Yes** Has it been confirmed that this course number is available for use?

*If no: Contact Registrar’s Office for assistance.*

16. **No** Does this course affect another program?

If yes, provide confirmation of acceptance/approval of changes from the Dean, Department Head, and/or Program Director whose area this affects.

Enter text...

**Course Details**

17. Outline (The course outline should be topical by weeks and should be sufficient in detail to allow for judgment of the content of the course.)

*Week 01 algorithm definition*

*Week 02 algorithm examples*

*Week 03 big-O and the growth of functions*

*Week 04 algorithm complexity*

*Week 05 best and worst case analysis*

*Week 06 average case analysis*

*Week 07 recursion*

*Week 08 set theory*

*Week 09 implementing set operations*

*Week 10 trees*

*Week 11 forests*

*Week 12 graphs*

*Week 13 graph modeling*

*Week 14 languages, grammars, finite state machines, Turing machines*

18. Special features (e.g. labs, exhibits, site visitations, etc.)

*N/A*

19. Department staffing and classroom/lab resources

Enter text...

1. Will this require additional faculty, supplies, etc.?

*No.*

20. **No** Does this course require course fees?

*If yes: please attach the New Program Tuition and Fees form, which is available from the UCC website.*

**Course Justification**

21. Justification for course being included in program. Must include:

a. Academic rationale and goals for the course (skills or level of knowledge students can be expected to attain)

*This course will serve as part of the core of the department’s graduate certificate in computer science education as well as its master of science in education. The student will become familiar with core abstract computer concepts and their instruction, preparing them for presentation of this material in the high school setting.*

b. How does the course fit with the mission established by the department for the curriculum? If course is mandated by an accrediting or certifying agency, include the directive.

*The department has accepted its responsibility to support the governor’s Computer Science Initiative to offer computer-coding classes to all Arkansas high schools. Providing this course, and in turn the certificate and degree requiring it, will help prepare more teachers to instruct in this topic in high school; further, in the long term the department will benefit from an increased number of students graduating from high school with a fuller awareness of, facility with, and interest in computer science.*

c. Student population served.

*Graduate.*

d. Rationale for the level of the course (lower, upper, or graduate).

*The student taking this course will have already completed a bachelor’s degree in education.*

**Assessment**

**University Outcomes**

22. Please indicate the university-level student learning outcomes for which this new course will contribute. Check all that apply.

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| * 1. **[ ]** Global Awareness | * 1. **[X ]** Thinking Critically | * 1. **[X ]** Information Literacy |

**Relationship with Current Program-Level Assessment Process**

23. What is/are the intended program-level learning outcome/s for students enrolled in this course? Where will this course fit into an already existing program assessment process?

1. Students will have a broad exposure to concepts in computer science.
2. Students will be able to think analytically in terms of understanding the nature of problems, crafting computer solutions for them, and evaluating those solutions.
3. Students will be able to communicate computer science concepts with clarity and effective exposition.

The course will be assessed along with other graduate courses on the same schedule.

24. Considering the indicated program-level learning outcome/s (from question #23), please fill out the following table to show how and where this course fits into the program’s continuous improvement assessment process.

*For further assistance, please see the ‘Expanded Instructions’ document available on the UCC - Forms website for guidance, or contact the Office of Assessment at 870-972-2989.*

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| **Program-Level Outcome 1 (from question #23)** | Students will have a broad exposure to concepts in computer science. |
| Assessment Measure | Comprehensive examinations and employer surveys |
| Assessment  Timetable | Comprehensive exams will be conducted each semester, reviewed annually, and reported on every three years; employer surveys will be conducted each fall and reported on every four years. |
| Who is responsible for assessing and reporting on the results? | Department of Computer Science assessment committee |

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| **Program-Level Outcome 2 (from question #23)** | Students will be able to think analytically in terms of understanding the nature of problems, crafting computer solutions for them, and evaluating those solutions. |
| Assessment Measure | Comprehensive examinations, student exit interview, and employer surveys |
| Assessment  Timetable | Comprehensive exams will be conducted each semester, reviewed annually, and reported on every three years; student exit interviews will be conducted each semester, reviewed annually, and reported on every three years; employer surveys will be conducted each fall and reported on every four years. |
| Who is responsible for assessing and reporting on the results? | Department of Computer Science assessment committee |

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| **Program-Level Outcome 3 (from question #23)** | Students will be able to communicate computer science concepts with clarity and effective exposition. |
| Assessment Measure | Comprehensive examinations, student exit interview and employer surveys |
| Assessment  Timetable | Comprehensive exams will be conducted each semester, reviewed annually, and reported on every three years; student exit interviews will be conducted each semester, reviewed annually, and reported on every three years; employer surveys will be conducted each fall and reported on every four years. |
| Who is responsible for assessing and reporting on the results? | Department of Computer Science assessment committee |

*(Repeat if this new course will support additional program-level outcomes)*

**Course-Level Outcomes**

25. What are the course-level outcomes for students enrolled in this course and the associated assessment measures?

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| **Outcome 1** | Students will get familiar with the theory of foundational programming concepts. |
| Which learning activities are responsible for this outcome? | In-class discussion and illustrations  Demonstration of analysis results in presentations |
| Assessment Measure | Course presentations, exams and projects |

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| **Outcome 2** | Students will master the corresponding analytical skills. |
| Which learning activities are responsible for this outcome? | Accomplish related literature reviews  Demonstrate the analysis results in presentations and exams |
| Assessment Measure | Course exams and presentations |

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| **Outcome 3** | Students will get experience which will develop their implementation skills. |
| Which learning activities are responsible for this outcome? | In-class discussion and illustrations  Accomplish related literature reviews  Conduct effective projects |
| Assessment Measure | Course homework, presentations, exams and projects |

*(Repeat if needed for additional outcomes)*

**Bulletin Changes**

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| **Instructions** |
| **Please visit** [**http://www.astate.edu/a/registrar/students/bulletins/index.dot**](http://www.astate.edu/a/registrar/students/bulletins/index.dot) **and select the most recent version of the bulletin. Copy and paste all bulletin pages this proposal affects below. Follow the following guidelines for indicating necessary changes.**  **\*Please note: Courses are often listed in multiple sections of the bulletin. To ensure that all affected sections have been located, please search the bulletin (ctrl+F) for the appropriate courses before submission of this form.**  - Deleted courses/credit hours should be marked with a red strike-through (~~red strikethrough~~)  - New credit hours and text changes should be listed in blue using enlarged font (blue using enlarged font).  - Any new courses should be listed in blue bold italics using enlarged font (***blue bold italics using enlarged font***)  *You can easily apply any of these changes by selecting the example text in the instructions above, double-clicking the ‘format painter’ icon 🡪 , and selecting the text you would like to apply the change to.*  *Please visit* [*https://youtu.be/yjdL2n4lZm4*](https://youtu.be/yjdL2n4lZm4) *for more detailed instructions.* |

**2017-2018 Graduate Bulletin**

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**CS 6823. Special Topics** Current topics of interest to graduate computer science  
students. (May be repeated for credit with different subtitle. ONLY six hours with the same course  
number will count toward the degree.) Prerequisite: CS 3113 or “B” or better in CS 5032.  
 **CS 688V. Independent Study**  
 **CS 689V. Thesis**  
 **Computer Science Education (CSED)  
  
*CSED 5731, Principles of Abstract Structures Foundational computer science concepts, including algorithm complexity and structures such as sets, trees, and graphs, with an emphasis on pedagogy in the secondary school.***   
 **DEPARTMENT OF MATHEMATICS AND STATISTICS**  
 **Mathematics (MATH)**