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

**New or Modified Course Proposal Form**

**[X] Undergraduate Curriculum Council**

**[ ] Graduate Council**

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

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

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| Jason L. Causey 9/24/2020 **Department Curriculum Committee Chair** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **COPE Chair (if applicable)** |
| Jake A. Qualls 9/24/2020 **Department Chair** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **Head of Unit (if applicable)** |
| Jason Stewart 9/25/2020  **College Curriculum Committee Chair** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **Undergraduate Curriculum Council Chair** |
| Summer DeProw 9/25/2020 **Office of Assessment (new courses only)** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **Graduate Curriculum Committee Chair** |
| Abhijit Bhattacharyya 9/24/2020 **College Dean** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **Vice Chancellor for Academic Affairs** |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **General Education Committee Chair (if applicable)** |  |

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

Jason L. Causey, jcausey@astate.edu, 870-972-3978 ext. 8182

1. **Proposed starting term and Bulletin year for new course or modification to take effect**

Starting Term: Spring 2022. Bulletin Year: 2021-2022.

**Instructions:**

*Please complete all sections unless otherwise noted. For course modifications, sections with a “Modification requested?” prompt need not be completed if the answer is “No.”*

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|  | **Current (Course Modifications Only)** | **Proposed (New or Modified)**  *(Indicate “N/A” if no modification)* |
| **Prefix** |  | **CSED** |
| **Number\*** |  | **4731** |
| **Title** |  | **Principles of Abstract Structures** |
| **Description\*\*** |  | **Foundational computer science concepts, including algorithm complexity and structures such as sets, trees, and graphs, with an emphasis on pedagogy in the secondary school.** |

***\**** (Confirm with the Registrar’s Office that number chosen has not been used before and is available for use. For variable credit courses, indicate variable range. *Proposed number for experimental course is 9*. )

\*\*Forty words or fewer as it should appear in the Bulletin.

1. **Proposed prerequisites and major restrictions** **[Modification requested? Yes/No]**

(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. **Yes** Are there any prerequisites?
   1. If yes, which ones?

“C” or better in CS 2124 or DATA 2004

* 1. Why or why not?

The material covered by the course requires understanding of advanced computer programming.

1. **No** Is this course restricted to a specific major?
   1. If yes, which major? Enter text...
2. **Proposed course frequency [Modification requested? Yes/No]**

(e.g. Fall, Spring, Summer; if irregularly offered, please indicate, “irregular.”) *Not applicable to Graduate courses.*

Spring

1. **Proposed course type [Modification requested? Yes/No]**

Will this course be lecture only, lab only, lecture and lab, activity (e.g., physical education), dissertation/thesis, capstone, independent study, internship/practicum, seminar, special topics, or studio? Please choose one.

Lecture only

1. **Proposed grade type [Modification requested? Yes/No]**

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

standard letter

1. **Yes** Is this course dual-listed (undergraduate/graduate)?
2. **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.)*

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

Enter text...

**b.** – **Yes / No** Can the cross-listed course be used to satisfy the prerequisite or degree requirements this course satisfies?

Enter text...

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

a. If yes, what program?

Data Science and Data Analytics

1. **No** Will this course be a one-to-one equivalent to a deleted course or previous version of this course (please check with the Registrar if unsure)?

a. If yes, which course?

Enter text...

**Course Details**

1. **Proposed outline** **[Modification requested? Yes/No]**

(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 1 algorithm definition

Week 2 algorithm examples

Week 3 big-O and the growth of functions

Week 4 algorithm complexity

Week 5 best and worst case analysis

Week 6 average case analysis

Week 7 recursion

Week 8 set theory

Week 9 implementing set operations

Week 10 trees

Week 11 forests

Week 12 graphs

Week 13 graph modeling

Week 14-15 languages, grammars, finite state machines, Turing machines

1. **Proposed special features** **[Modification requested? Yes/No]**

(e.g. labs, exhibits, site visitations, etc.)

N/A

1. **Department staffing and classroom/lab resources**

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

**No**.   
The course will be in rotation with the dual-listed graduate course which has been in the rotation for several years. Its addition to the bulletin as a regular course will have no impact on department staffing or resources

1. **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.*

**Justification**

**Modification Justification (Course Modifications Only)**

1. Justification for Modification(s)

Enter text...

**New Course Justification (New Courses Only)**

1. Justification for course. 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 a core of the Data Science track in the new program in Data Science and Data Analytics. It could also serve as part of the core of the potential certificate in computer science education. In addition, it will serve as one prerequisite for the graduate degree in computer science. 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 of the department? If course is mandated by an accrediting or certifying agency, include the directive.

In response to the governor’s Computer Science Initiative, the department has already encompassed computer science education as part of its mission, and this course’s role in the potential certificate in computer science education is an evident fit. Beyond that, its role in the new Data Science and Data Analytics program allows the department to contribute the same kind of support it already provides to a number of other programs, keeping with the mission as previously executed.

c. Student population served.

Juniors/seniors in the Data Science and Data Analytics program.

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

Students should enroll in this course having a comprehensive understanding about programming skills.

**Assessment**

**Assessment Plan Modifications (Course Modifications Only)**

1. **Yes / No** Do the proposed modifications result in a change to the assessment plan?

*If yes, please complete the Assessment section of the proposal*

**Relationship with Current Program-Level Assessment Process (Course modifications skip this section unless the answer to #18 is “Yes”)**

1. 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?

3) Design and implement a solution to a problem in the realm of data science/data analytics through problem identification, problem solving, decision making, visualization, data analysis and reporting.

1. Considering the indicated program-level learning outcome/s (from question #19), 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 3 (from question #19)** | Design and implement a solution to a problem in the realm of data science/data analytics through problem identification, problem solving, decision making, visualization, data analysis and reporting. |
| Assessment Measure | Assessed in DATA 4013: Capstone Design. A hierarchical final project review panel consisting of peer, stakeholder, and faculty reviews in a rubric format. Students will complete an exit survey. |
| Assessment  Timetable | Assessment data is gathered at the end of each semester in which the DATA 4013 capstone course is offered; review occurs on an annual basis. |
| Who is responsible for assessing and reporting on the results? | Instructor of record for DATA 4013 directs final project review, collects rubrics from the panel, and collates the results. Program director reviews results and reports to the Program Steering Committee. Program director may recommend changes, to be approved by the Steering Committee, or changes may be recommended by the Steering Committee directly. |

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

**Course-Level Outcomes**

1. 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. Please include a before (with changed areas highlighted) and after of all affected sections.**  **\*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.** |

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Before:

**CS 483V. Internship** Supervised work experience participating in application system development in a business and manufacturing environment. Grade earned will be pass or fail. Prerequisites. Permission of the Computer Science faculty and CS 3113. Irregular.

**Digital Design (DIGI)**

After (NOTE – All newly proposed CSED courses are shown along with the new “Computer Science Education (CSED)” section header. The current proposed course is highlighted in yellow.):

**CS 483V. Internship** Supervised work experience participating in application system development in a business and manufacturing environment. Grade earned will be pass or fail. Prerequisites. Permission of the Computer Science faculty and CS 3113. Irregular.

**Computer Science Education (CSED)**

**CSED 4231. Principles of Operating Systems** Policies, design issues, and implementation techniques for operating system software. Synchronization, process scheduling, memory and storage management, and system protection with an emphasis on pedagogy in the secondary school. Dual listed with CSED 5231. Prerequisite, “C” or better in CS 2124 or DATA 2004. Spring.

**CSED 4241. Principles of Computer Organization** Basic principles of computer architectural design with an emphasis on pedagogy in the secondary school. Dual listed with CSED 5241. Prerequisite, “C” or better in CS 2124 or DATA 2004. Spring.

**CSED 4731. 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. Dual listed with CSED 5731. Prerequisite, “C” or better in CS 2124 or DATA 2004. Spring.

**Digital Design (DIGI)**