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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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| Jeff Jenness 11/5/2019 **Department Curriculum Committee Chair** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **COPE Chair (if applicable)** |
| Hung-Chi Su 11/5/2019 **Department Chair:** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **Head of Unit (If applicable)** |
| Brandon Kemp 11/08/2019  **College Curriculum Committee Chair** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **Undergraduate Curriculum Council Chair** |
| Abhijit Bhattacharyya 11/8/2019  **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)

Hai Jiang, hjiang@astate.edu, 870-680-8164

2. Proposed Starting Term and Bulletin Year

Spring, 2020

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*. )

CS 6353

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).

Hardware Security

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

A comprehensive overview of electronic devices and computer hardware subsystems at all levels, related hardware attacks and their corresponding countermeasures as well as major security services provided by computer hardware.

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

Prerequisites, CS 3113 or “B” or better in CS 5032, and CS 3223.

* 1. Why or why not?

Basic computer software and hardware background.

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

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

Enter text...

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

No.

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

*(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? No.

Please explain. Enter text...

12. **Yes / No** Is this course in support of a new program? No.

a. If yes, what program?

Enter text...

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

a. If yes, what course?

Enter text...

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

a. If yes, which course?

Enter text...

15. **Yes / No** Has it been confirmed that this course number is available for use? Yes.

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

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

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 1: Introduction to Hardware Security and Quick Overview of Electronic Hardware

Week 2: System on Chip (SoC) Design and Test

Week 3: Printed Circuit Board (PCB): Design and Test

Week 4: Hardware Trojans

Week 5: Electronics Supply Chain

Week 6: Hardware IP Piracy and Reverse Engineering

Week 7: Side-Channel Attacks

Week 8: Test-Oriented Attacks

Week 9: Physical Attacks and Countermeasures

Week 10: Attacks on PCB: Security Challenges and Vulnerabilities

Week 11: Hardware Security Primitives

Week 12: Security and Trust Assessment, and Design for Security

Week 13: Hardware Obfuscation

Week 14: PCB Authentication and Integrity Validation

Week 15: System Level Attacks & Countermeasures

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

No.

19. Department staffing and classroom/lab resources

No.

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

No.

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

*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)

Cybersecurity has been an important component in homeland security system. Students will gain knowledge about computer hardware and related security issues. This advanced course will help students acquire security skills in the hardware aspect of computer system.

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.

Computer Science Department has offered a graduate certificate for Cyber Security. The existing courses mainly cover other aspects of cybersecurity. This new course will provide a new angle to address security issue.

c. Student population served.

Graduate students.

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

Students should have comprehensive understanding about computer systems and the sophisticated hardware structure concepts as well as programming skills.

**Assessment**

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

22. 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. M.S. Computer Science graduate students should have a deeper understanding of the theory and application of algorithms, programming languages, and computer processes.
2. M.S. Computer Science graduate students should have the ability to apply advanced analysis techniques to problem identification and solution in computing applications.
3. M.S. Computer Science graduate students should have the ability to apply advanced implementation techniques to problem identification and solution in computing applications.

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

23. 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)** | M.S. Computer Science graduate students should have a deeper understanding of the theory and application of algorithms, programming languages, and computer processes. |
| 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 assessment committee |

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| **Program-Level Outcome 2 (from question #23)** | M.S. Computer Science graduate students should have the ability to apply advanced analysis techniques to problem identification and solution in computing applications. |
| 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 assessment committee. |

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| **Program-Level Outcome 3 (from question #23)** | M.S. Computer Science graduate students should have the ability to apply advanced implementation techniques to problem identification and solution in computing applications. |
| 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 assessment committee. |

**Course-Level Outcomes**

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

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| **Outcome 1** | Students should be able to analyze computer hardware, detect hardware security issues and propose certain countermeasures. |
| Which learning activities are responsible for this outcome? | Identify hardware levels  Understand major hardware devices and subsystems  Detect security issues at different levels  Provide related countermeasures |
| Assessment Measure | Exam questions and term 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.* |

**CS 6343. Cloud Security** Survey of the major security aspects of cloud computing and the corresponding mechanisms, including cloud security management, architecture and measurement as well as virtual machine security and real world cloud security examples. Prerequisites, CS 3113 or “B” or better in CS 5032, and CS 3233.

**CS 6353. Hardware Security** A comprehensive overview of electronic devices and computer hardware subsystems at all levels, related hardware attacks and their corresponding countermeasures as well as major security services provided by computer hardware. Prerequisites, CS 3113 or “B” or better in CS 5032, and CS 3223.

**CS 6413. Solid Modeling** Examination of advanced modeling techniques with emphasis on radiosity. Techniques for rapid interactive display of a complex three-dimensional environment will be developed. Prerequisite: CS 3113 or “B” or better in CS 5032 or CS 5423.