Mississippi State University
Graduate Council
December 17, 1:30 pm

Call to Order: Dr. Rebecca Robichaux-Davis, Chair

Welcome and Introductions

Approval of minutes: November 30, 2018

Report from UCCC: Dr. Dana Franz

1. Modification of the Ph.D. in Computer Science (Starkville and Distance)
2. Modification of the MS in Computer Science (Starkville and Distance)
3. Modification of the MS in Cyber Security & Operations (Starkville and Distance)

Report from the Graduate School: Dr. Henry

Report from the Graduate Student Association: John Buol

Adjourn
November 30, 2018

PRESENT: Amy Adkerson (Jenny Turner), Kevin Armstrong, Linkan Bian, Russell Carr, Timothy Chamblee, Frances Coleman (Patricia Matthes), Lara Dodds, Dana Franz, Don Grebner, Larry Hanson, Richard Harkess, W. Brien Henry, Priscilla Hill, Beth Miller, Rebecca Robichaux-Davis, Peter Ryan, Susan Seal (Marian Montgomery Chancellor), Chien Yu Coleman (Patricia Matthes), Lara Dodds, Dana Franz, Don Grebner, Larry Hanson, Richard Harkess, W. Brien Henry, Priscilla Hill, Beth Miller, Rebecca Robichaux-Davis, Peter Ryan, Susan Seal (Marian Montgomery Chancellor), Chien Yu

ABSENT: Henk Arnoldus, Judy Bonner, Ashli Brown Johnson, John Buol, Joel Collier, Julie Jordan, Laura Marler, David Shaw

REGULARE ATTENDERS: Alexis Davis, Erica Waldman

GUEST: Joseph Emerson

I. The November 30, 2018 meeting of the Graduate Council of Mississippi State University was called to order by Chair Dr. Rebecca Robichaux-Davis at 1:34 PM in the Templeton Room of Mitchell Memorial Library.

II. Robichaux-Davis asked for approval of the minutes from the October 26, 2018 meeting. Russell Carr moved to approve and Lara Dodds seconded. The motion passed unanimously.

III. Report from University Committee on Courses and Curricula (UCCC): Dana Franz

- **Modification of the Master of Science in Chemistry – Joseph Emerson**
  
  Dana Franz asked to bring forward the modification of the Master of Science in Chemistry and asked for a second; Chien Yu second. Dana Franz stated the chemistry department is proposing to introduce a non-thesis option along with the thesis option they currently provide. This modification will allow the department to be more competitive by allowing the student to decide between options, depending on career goals. Harkess brought forth concern with the ambiguity in the proposed degree description, specifically the last paragraph of the description which addresses the non-thesis option requirement.

  After a brief discussion, Kevin Armstrong moved approval with a friendly amendment to the last paragraph in the proposed description, with an insertion of “with graduate coordinator approval”; Richard Harkess second. The motion carried unanimously.

- Dr. Franz stated that the committee reviews UCCC implemented last year has made UCCC have more integrity across all courses they review and has sped up the process, allowing for more solid proposals to move forward to the Graduate Council and the Office of the Provost.

IV. Report from the Graduate School: Dr. Ryan

Dr. Ryan announced the following:

- The Graduate School is encouraging departments to make decisions on pending applications in order to get decisions back to the students.

- The Graduate School will send academic deficiency records to the departments the day after final grades are posted, in order for the department to decide and move on the appropriate action.
• Dr. Ryan announced the complete review of the first 30 pages of the Graduate Catalog by the subcommittee from the Associate Dean’s Council.

• Dr. Ryan expressed his appreciation to all faculty and staff that encouraged students to submit slides to the Three Minute Thesis competition and aiding in making it a success.

• Departments are beginning to submit students for the Lapsed Graduate Student program and the Graduate School is encouraging other department to bring forward any qualifying applicants.

• Dual Bachelor-Master’s degree programs provide a path forward for exceptional students. The Associate Deans are discussing how to place every master’s program in the position to offer an accelerated program.

V. Report from the Graduate Student Association (GSA): John Buol
   • No Report

VI. There being no further business, the meeting adjourned at 2:20 p.m.
NOTE: This form is a cover sheet that must accompany the degree program change proposal. The actual proposal should be prepared in accordance with format requirements provided in the Guide and Format for Curriculum Proposals published by the UCCC. Both cover sheet and proposal should be submitted to UCCC Mail Stop 9702 (281 Garner Hall), Phone: 325-9410.

College: Bagley College of Engineering
Contact Person: Dr. T.J. Jankun-Kelly
Nature of Change: Modification
Current Degree Program Name: Computer Science (Starkville & Distance)

Department: Computer Science & Eng.
Mail Stop: 9637
E-mail: tjk@cse.mstate.edu
Date Initiated: 11/18
Effective Date: 1/19

New Degree Program Name: Computer Science (Starkville & Distance)
Major: PhD
Concentration: N/A

Summary of Proposed Changes:
Prerequisites changed. Distribution of courses changed. Catalog text changed.

Approved:

Date:

Chair, College or School Curriculum Committee

11/26/18

Chair, University Committee on Courses and Curricula

11/26/18

Chair, Graduate Council

10/11/18

Chair, Deans Council
1. Catalog Description

Graduate study is offered in the Department of Computer Science and Engineering leading to the degrees of Master of Science in Computer Science, Master of Science in Cyber Security and Operations, and Doctor of Philosophy in Computer Science.

The program of study of a Master of Science in Computer Science degree includes advanced courses in computer science that are selected according to the goals of the student. The program of study includes a thesis option, a professional project option, or courses-only option. The program of study of a Doctor of Philosophy (Ph.D.) in Computer Science degree includes advanced courses in computer science and significant scholarly research in computer science, presented in a dissertation. Applicants with bachelor degrees can apply for direct admission to the Ph.D. program. Applicants with master's degrees are also welcome.

The department’s core research areas include the following.
* Artificial intelligence
* Computational science
* Graphics
* Human centered computing
* Software engineering and systems

These core competencies support research applications in areas such as bioinformatics, visualization, computer security and forensics, human-computer interactions and high performance computing. Faculty, research assistants, thesis students, and dissertation students participate in a wide variety of research projects. Many research projects are multi-disciplinary or multi-specialty in nature.

2. Graduate Degree Curriculum Outline

Deletions in italics and additions in bold.

<table>
<thead>
<tr>
<th>CURRENT Degree Description</th>
<th>PROPOSED Degree Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree: Computer Science</td>
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</tr>
<tr>
<td>Major: PhD</td>
<td>Major: PhD</td>
</tr>
<tr>
<td>Concentrations: None</td>
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**Masters and PhD in Computer Science**

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- Artificial intelligence
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These core competencies support research applications in areas such as bioinformatics, visualization, computer security and forensics, human-computer interactions, robotics, and high performance computing. Faculty, research assistants, thesis students, and dissertation students participate in a wide variety of research projects. Many research projects are multi-disciplinary or multi-specialty in nature.

An entering PhD student with an MS degree should have a 3.50/4.00 grade point average on MS work, while a PhD student entering with only a BS degree is expected to have a 3.50/4.00 on overall undergraduate work. A student with a lower GPA may still be eligible for admission based on outstanding qualifications in other areas. A student must complete the GRE with a competitive score before admission; international students require a suitable demonstration of English proficiency. Candidates for the PhD degree must have completed all prerequisite courses or their equivalent. Finally, a student must possess those qualifications and research interests that indicate to the Computer Science and Engineering Graduate Studies Committee that the applicant will be successful in the computer science doctoral program. For additional details, consult the CS Department's Graduate Handbook.
<table>
<thead>
<tr>
<th>CURRENT CURRICULUM OUTLINE</th>
<th>Required Hours</th>
<th>PROPOSED CURRICULUM OUTLINE</th>
<th>Required Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Theory Courses</strong></td>
<td>6</td>
<td><strong>Core Courses</strong></td>
<td>3–7</td>
</tr>
<tr>
<td>Select two of the following:</td>
<td></td>
<td>The CS Core ensures students are prepared for graduate study and have a background in computer theory suitable for a graduate degree in computer science.</td>
<td></td>
</tr>
<tr>
<td>• CSE 8813 Theory of Computation</td>
<td></td>
<td>• CSE 8011: Seminar</td>
<td></td>
</tr>
<tr>
<td>• CSE 8843 Complexity of Sequential and Parallel Algorithms</td>
<td></td>
<td>Students with a previous MS do not have to complete 8011 if completed during MS work and require the completion of only 3 hours of Theory.</td>
<td></td>
</tr>
<tr>
<td>• CSE 8990 Special Topics in Computer Science &amp; Engineering</td>
<td></td>
<td>Classes designated as theory in advance by the faculty can be used to substitute for the theory requirement on a case-by-case basis.</td>
<td></td>
</tr>
<tr>
<td>CSE8990 may only be chosen if it has been designated in advance by the department as a theory course fulfilling this requirement.</td>
<td></td>
<td>(Folded into Core section)</td>
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</tr>
<tr>
<td><strong>Seminar Course</strong></td>
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<td></td>
<td></td>
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<tr>
<td>• CSE 8011 Graduate Seminar</td>
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<tr>
<td>Areas of Concentration</td>
<td>18</td>
<td>Primary Specialization</td>
<td></td>
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</tr>
<tr>
<td>Select at least four full graduate courses from one area (the area of concentration) below and at least two full graduate courses from one other area below (the supporting area):</td>
<td>6–15</td>
<td>Students will complete 15 hours in a primary specialization approved by their committee. One of these courses must be a required introductory course at the split level. Two separate courses must also be completed at the full graduate level in the specialization.</td>
<td></td>
</tr>
<tr>
<td>• Artificial Intelligence</td>
<td></td>
<td>Students with a previous MS must complete 6 hours in their primary specialization, 3 hours of which must be at the full graduate level. If the student did not complete the required introductory course in their previous work, it must still be completed.</td>
<td></td>
</tr>
<tr>
<td>• Software Engineering</td>
<td></td>
<td><strong>Secondary Specialization</strong></td>
<td></td>
</tr>
<tr>
<td>• High Performance Computing</td>
<td></td>
<td>Students will complete 9 hours in a primary specialization approved by their committee. One of these courses must be a required introductory course at the split level. A separate course must also be completed at the full graduate level in the specialization.</td>
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<tr>
<td>• Graphics and Visualization</td>
<td></td>
<td>Students with a previous MS must complete 3 hours in their secondary specialization at the split or full graduate level. If the student did not complete the required introductory course in their previous work, it must still be completed.</td>
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<tr>
<td>• Computer Security</td>
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<td><strong>Secondary Specialization</strong></td>
<td></td>
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</tbody>
</table>

Courses applying directly to the student's research and approved by the student's Graduate Committee may be included in the research area coursework, even if they are offered from another area or by another department.
### Fundamental Area Courses

At least three of the following:
- CSE 6153 Data Communications and Computer Networks
- CSE 6163 Designing Parallel Algorithms
- CSE 6214 Introduction to Software Engineering
- CSE 6413 Principles of Computer Graphics
- CSE 6503 Database Management Systems
- CSE 6633 Artificial Intelligence

A student who has taken any of these six courses for undergraduate credit may use the undergraduate course to meet the graduate Fundamental Areas requirement and substitute another graduate-level course approved by the student's graduate committee.

### Additional Coursework

- Graduate Coursework: 9 hours

A minimum of 15 credit hours of the courses in the program of study must be at the full graduate level (numbered 8000 or 9000).

### Dissertation Hours

- CSE 9000 Dissertation Research/Dissertation in Computer Science and Engineering

### Total Hours

<table>
<thead>
<tr>
<th>Fundamentals</th>
<th>9</th>
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<tbody>
<tr>
<td>(Folded into Specializations above)</td>
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<tr>
<td>Additional Coursework</td>
<td>9</td>
</tr>
<tr>
<td>For direct admit students, additional graduate work must be completed:</td>
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<tr>
<td>• Graduate Coursework</td>
<td></td>
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<tr>
<td>Any required courses in the Core or a Specialization previously completed by a student may be applied for completion and replaced with another free course of the student's and committee's choosing</td>
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<tr>
<td>A minimum of 21 credit hours of the courses in the total program of study for direct admit students must be at the full graduate level (numbered 8000 or 9000). This excludes dissertation hours.</td>
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</table>

<table>
<thead>
<tr>
<th>Dissertation Hours</th>
<th>20</th>
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</thead>
<tbody>
<tr>
<td>CSE 9000 Dissertation Research/Dissertation in Computer Science and Engineering</td>
<td></td>
</tr>
</tbody>
</table>

| Total Hours | 63 |

### Total Hours

32–63

#### 3. Justification and Student Learning Outcomes

These changes make the admissions in line with future changes to our BS degrees, add a differential admit option in line with the College, and raise the GPA requirement in line with the College. No changes to the number of course hours or to the courses offered are being made.

**Admission Changes:** Recent proposed changes to our BS programs are moving to drop the requirement for MA 2733: Cal III in the program. If it is removed from our BS programs, we need to remove it from our Graduate
programs or put our students in situation where they are not eligible for our program. In addition, the number of our requirements made it difficult to admit students or have them graduate in a timely manner; it is also not in line with Peer institutions (we currently have the most of those surveyed). Thus, additional simplifications were made: Microprocessors and Programming Languages were removed; Formal Languages was moved to be an option with Algorithms. This set of prerequisites cover the requirements of our focus area courses and are in line with Peer/Peer+ universities. Additionally, a differential admit option to the PhD program was added due to changes at the Graduate School requiring programs without differential admission to transfer coursework formally into CAPP—a burden the faculty did not feel was appropriate for our program. Other BCoE programs also have such an option so we are now in line with the rest of the College. Finally, the GPA requirement was raised to be in line with other Peer/Peer+ and BCoE programs; students that may have been direct PhD admits before with a lower GPA may now enter via completion of the MS. While this may decrease our PhD numbers initially, we foresee a stronger pool for better retention and research (and thus publications, grants, and post-graduate success).

For simplified differences between the direct and MS PhD admits, for Direct Admit PhD students, the program of study requires 63 credit hours (the same as our current program):
  • 7 hours in the CS Core (Seminar & Theory)
  • 15 hours in the Primary Specialization
  • 9 hours in the Secondary Specialization
  • 12 free course hours
  • 20 dissertation hours

For PhD students with a previous masters, the program of study requires 32 credit hours post MS degree:
  • 3–4 hours in the CS Core (Seminar & Theory)
  • 6 hours in the Primary Specialization, of which at least 3 must be full graduate hours
  • 3 hours in the Secondary Specialization
  • 20 dissertation hours

Change of Structure: Fundamental courses were removed but added to our list of courses of specializations; they are also still listed a part of our Qualifying Exam structure in our Graduate Handbook. In addition, the structure of the specializations was modified to allow easier transition from MS to PhD from State via the choices made in the non-direct admit option. As we do currently, a list of suggested specialization will be kept in the department as a live document, allowing us to update it as faculty and department needs change. The courses previously in the Fundamental areas are all requirements for some specialization on the list.

4. Support

A letter of support from the Graduate Coordinator of the Department of Computer Science and Engineering is attached.

5. Proposed 4-Letter Abbreviation

The MSU registrar has adopted CS as the abbreviation of Computer Science degrees.

6. Effective Date

Spring 2019
November 7, 2018

University Committee on Courses & Curricula
218 Garner Hall
Mailstop 9702
Mississippi State University

UCCC Committee,

With this letter, the Department of Computer Science & Engineering requests changes to the admission requirements for our CS MS & PhD degrees and our CYSO MS degree. Similarly, we request changing the structure in terms of courses required for all three degrees to better serve our students and ensure they graduate in a timely fashion. Edits and classifications to our Catalog entries are also provided. These modifications were approved by the faculty of Computer Science & Engineering at our faculty meeting on Thursday, November 1st, 2018.

Please do not hesitate to contact me if additional information is needed.

Sincerely yours,

Dr. T.J. Jankun-Kelly
Director of Graduate Studies
November 5, 2018

University Committee on Courses and Curricula
PO Box 5268
Mississippi State, MS 39762

Dr. Franz:

Please find attached a proposal to modify the MS and PhD degrees in Computer Science. The Computer Science and Engineering faculty voted unanimously to approve this addition at the faculty meeting on November 2, 2018.

Please feel free to contact me if there are any questions or concerns.

Sincerely,

[Signature]
Andy D. Perkins, Ph.D.
CSE Courses and Curricula Chair
Associate Professor

[Signature]
Christopher Archibald, Ph.D.
CSE Courses and Curricula Member
Assistant Professor

[Signature]
Joseph Crumpton, Ph.D.
CSE Courses and Curricula Member
Assistant Clinical Professor

[Signature]
Christopher McDaniel
CSE Courses and Curricula Member
Instructor
APPROVAL FORM FOR

DEGREE PROGRAMS

MISSISSIPPI STATE UNIVERSITY

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College: Bagley College of Engineering
Department: Computer Science & Eng.

Contact Person: Dr. T.J. Jankun-Kelly
Mail Stop: 9637  E-mail: tjk@cse.mstate.edu
Nature of Change: Modification
Date Initiated: 11/18  Effective Date: 1/19
Current Degree Program Name: Computer Science (Starkville & Distance)

Major: MS  Concentration: N/A

New Degree Program Name: Computer Science (Starkville & Distance)
Major: MS  Concentration: N/A

Summary of Proposed Changes:

Prerequisites changed. Distribution of courses changed. Catalog text changed.

Approved:

Date:

Department Head

11/2/18

Chair, College or School Curriculum Committee

11/26/18

Dean of College or School

11/26/18

Chair, University Committee on Courses and Curricula

12/11/18

Chair, Graduate Council (if applicable)

Chair, Deans Council
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The department’s core research areas include the following.
- Artificial intelligence
- Computational science
- Graphics
- Human centered computing
- Software engineering and systems

These core competencies support research applications in areas such as bioinformatics, visualization, computer security and forensics, human-computer interactions and high performance computing. Faculty, research assistants, thesis students, and dissertation students participate in a wide variety of research projects. Many research projects are multi-disciplinary or multi-specialty in nature.

2. Graduate Degree Curriculum Outline

Deletions in *italics* and additions in **bold**.

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**Masters and PhD in Computer Science**

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MS applicants are required to have a 3.0 GPA in overall undergraduate work and must complete the GRE with a competitive score before admission; international students require a suitable demonstration of English proficiency. Candidates for the master’s degree must have completed all prerequisite courses or their equivalent. For additional details, consult the CS Department’s Graduate Handbook.

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### Theory Courses

One of the following:
- CSE 8813 Theory of Computation
- CSE8833 Algorithms
- CSE 8843 Complexity of Sequential and Parallel Algorithms
- CSE 8990 Special Topics in Computer Science & Engineering

CSE8990 may only be chosen if it has been designated in advance by the department as a theory course fulfilling this requirement.

### Core Courses

The CS Core ensures students are prepared for graduate study and have a background in computer theory suitable for a graduate degree in computer science.
- CSE 8011: Seminar

Classes designated as theory in advance by the faculty can be used to substitute for the theory requirement on a case-by-case basis.

### Seminar Course

- CSE 8011 Graduate Seminar

(Folded into Core section)

### Fundamental Area Courses

At least three of the following:
- CSE 6153 Data Communications and Computer Networks
- CSE 6163 Designing Parallel Algorithms
- CSE 6214 Introduction to Software Engineering
- CSE 6413 Principles of Computer Graphics
- CSE 6503 Database Management Systems
- CSE6633 Artificial Intelligence

A student who has taken any of these six courses for undergraduate credit may use the undergraduate course to meet the graduate Fundamental Areas requirement and substitute another graduate-level course approved by the student's graduate committee.

### Primary Specialization

Students will complete 9 hours in a primary specialization approved by their committee. One of these courses must be a required introductory course at the split level. A separate course must also be completed at the full graduate level in the specialization.
### Non-Thesis Option

- **Graduate Coursework.**

  A minimum of 15 credit hours of the courses in the program of study must be at the full graduate level (numbered 8000 or 9000). One of the three additional courses may be CSE 8080 if the student's major professor (or another member of the student's graduate committee) agrees to direct the project.

### Thesis Option

- **Graduate Coursework: 12 hours**
- **CSE 8000 Thesis Research/Thesis in Computer Science and Engineering: 6 hours**

  A minimum of 15 credit hours of the courses in the program of study must be at the full graduate level (numbered 8000 or 9000).

### Secondary Specialization

- **18**

  Students will complete 6 hours in a primary specialization approved by their committee. One of these courses must be a required introductory course at the split level.

### Additional Coursework

- **12**

  - **Graduate Coursework, possibly including directed project or thesis**

    Students, in cooperation with their committee, can choose to do a directed project or a thesis to replace some of these additional 12 hours. A directed project requires taking course CSE 8080 under the direction of the student's major professor or other member of the student's committee. A thesis requires 6 hours of CSE 8000 under the guidance of a thesis director as per the Catalog.

    Any required courses in the Core or a Specialization previously completed by a student may be applied for completion and replaced with another free course of the student's and committee’s choosing.

    A minimum of 15 credit hours of the courses in the total program of study must be at the full graduate level (numbered 8000 or 9000).

<table>
<thead>
<tr>
<th>Total Hours</th>
<th>31</th>
<th>Total Hours</th>
<th>31</th>
</tr>
</thead>
</table>

### 3. Justification and Student Learning Outcomes

These changes simplify the description our our MS program, tie courses to our faculty's focus areas in a manner similar to our PhD program, and make the admissions in line with future changes to our BS degrees. No changes to the number of course hours or to the courses offered are being made.

**Admission Changes:** Recent proposed changes to our BS programs are moving to drop the requirement for MA 2733: Cal III in the program. If it is removed from our BS programs, we need to remove it from our Graduate programs or put our students in situation where they are not eligible for our program. In addition, the number of our requirements made it difficult to admit students or have them graduate in a timely manner; it is also not in line with Peer institutions (we currently have the most of those surveyed). Thus, additional simplifications were made: Microprocessors and Programming Languages were removed; Formal Languages was moved to be an option with Algorithms. This set of prerequisites cover the requirements of our focus area courses and are in line with Peer/
Peer+ universities.

Change of Structure: Instead of a Fundamental Area/Theory/Seminar/Additional Courses structure, we now have a Core/Primary Specialization/Secondary Specialization/Additional Courses structure. This structure is in line with our PhD program (which already requires speculations) and thus benefits students transitioning from an MS to a PhD here. A list of suggested specialization will be kept in the department as a live document, allowing us to update it as faculty and department needs change. The course previously in the Fundamental areas are all requirements for some specialization on the list.

4. Support

A letter of support from the Graduate Coordinator of the Department of Computer Science and Engineering is attached.

5. Proposed 4-Letter Abbreviation

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6. Effective Date

Spring 2019
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Please do not hesitate to contact me if additional information is needed.

Sincerely yours,

[Signature]

Dr. T.J. Jankun-Kelly
Director of Graduate Studies
November 5, 2018

University Committee on Courses and Curricula
PO Box 5268
Mississippi State, MS  39762

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Andy D. Perkins, Ph.D.
CSE Courses and Curricula Chair
Associate Professor

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CSE Courses and Curricula Member
Assistant Professor

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Joseph Crumpton, Ph.D.
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NOTE: This form is a cover sheet that must accompany the degree program change proposal. The actual proposal should be prepared in accordance with format requirements provided in the Guide and Format for Curriculum Proposals published by the UCCC. Both cover sheet and proposal should be submitted to UCCC Mail Stop 9702 (281 Garner Hall), Phone: 325-9410.

College: Bagley College of Engineering
Department: Computer Science & Eng.
Contact Person: Dr. T.J. Jankun-Kelly
Mail Stop: 9637  E-mail: tjk@cse.mstate.edu
Nature of Change: Modification
Date Initiated: 11/18  Effective Date: 1/19

Current Degree Program Name: Cyber Security & Operations (Starkville & Distance)
Major: MS  Concentration: Operations, Defense

New Degree Program Name: Cyber Security & Operations (Starkville & Distance)
Major: MS  Concentration: Operations, Defense

Summary of Proposed Changes:

Prerequisites changed. Distribution of courses changed. Catalog text changed.

Approved:

Date:

11/12/18

11/26/18

11/24/18

Chair, Graduate Council (if applicable)

Chair, Deans Council
1. Catalog Description

The Master of Science in Cyber Security and Operations is designed for students who wish to help meet the challenges posed by increasing cyber-threats. Using a multidisciplinary approach, the program is designed to provide students with a focused education within a broad analytical framework for evaluating, understand, and solving cyber security problems. Either concentration will allow a thesis or non-thesis option.

The Cyber Defense concentration will focus on those aspects of cyber security needed to prepare an enterprise level system to protect itself. Material will prepare the students for developing cyber security policies to comply with existing and future laws, conducting risk assessment in enterprise to determine compliance with requirements and implementing security solutions for the enterprise.

The Cyber Operations concentration will focus on those aspects of cyber security that are needed to operate in the cyber domain. Material will prepare the student for advanced operations in the cyber domain such as penetration testing, after action analysis, and malware analysis. This concentration is designed to satisfy the requirements for the Center of Academic Excellence in Cyber Operations program of the Department of Defense.

2. Graduate Degree Curriculum Outline

Deletions in *italics* and additions in **bold**.

<table>
<thead>
<tr>
<th>CURRENT Degree Description</th>
<th>PROPOSED Degree Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree: Cyber Security and Operations</td>
<td>Degree: Cyber Security and Operations</td>
</tr>
<tr>
<td>Concentrations: Cyber Defense, Cyber Operations</td>
<td>Concentrations: Cyber Defense, Cyber Operations</td>
</tr>
</tbody>
</table>
Graduate study is offered in the Department of Computer Science and Engineering leading to the degrees of Master of Science in Computer Science, Master of Science in Cyber Security and Operations, and Doctor of Philosophy in Computer Science.

**Cyber Security And Operations**

The Master of Science in Cyber Security and Operations is designed for students who wish to help meet the challenges posed by increasing cyber-threats. The Cyber Defense concentration will focus on those aspects of cyber security needed to prepare an enterprise level system to protect itself; while the Cyber Operations concentration will focus on those aspects of cyber security that are needed to operate in the cyber domain. Using a multidisciplinary approach, the program is designed to provide students with a focused education within a broad analytical framework for evaluating, understand, and solving cyber security problems. Either concentration will allow a thesis or non-thesis option.

MS applicants are required to have a 3.0 GPA in overall undergraduate work and complete the GRE to the committee's satisfaction before admission; international students require a suitable demonstration of English proficiency. Candidates for the master's degree must have completed all prerequisite courses or their equivalent. For additional details, consult the CS Department's Graduate Handbook.

<table>
<thead>
<tr>
<th>CURRENT CURRICULUM OUTLINE</th>
<th>Required Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Major Required Courses</strong></td>
<td>16</td>
</tr>
<tr>
<td>- CSE 8011 Graduate Seminar</td>
<td></td>
</tr>
<tr>
<td>- CSE 6243 Information and</td>
<td></td>
</tr>
<tr>
<td>Computer Security</td>
<td></td>
</tr>
<tr>
<td>- CSE 6273 Introduction to</td>
<td></td>
</tr>
<tr>
<td>Computer Forensics</td>
<td></td>
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<tr>
<td>- CSE 6383 Cryptography and</td>
<td></td>
</tr>
<tr>
<td>Network Security</td>
<td></td>
</tr>
<tr>
<td>- CSE 8723 Cyber Law and</td>
<td></td>
</tr>
<tr>
<td>Policy</td>
<td></td>
</tr>
<tr>
<td>- CSE 8743 Advanced Network</td>
<td></td>
</tr>
<tr>
<td>Security</td>
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</table>

<table>
<thead>
<tr>
<th>PROPOSED CURRICULUM OUTLINE</th>
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<tbody>
<tr>
<td><strong>Major Required Courses</strong></td>
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</tr>
<tr>
<td>- CSE 8011 Graduate Seminar</td>
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<tr>
<td>- CSE 6243 Information and</td>
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<td>Computer Security</td>
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</table>

<table>
<thead>
<tr>
<th>Concentration: Cyber Defense</th>
<th>Required Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>- BIS 6113 Business Information Systems Security Management</td>
<td></td>
</tr>
<tr>
<td>- Two advanced Cyber Security electives</td>
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</table>

<table>
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<tr>
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<th>Required Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>- BIS 6113 Business Information Systems Security Management</td>
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</tr>
<tr>
<td>- Advanced Cyber Defense electives</td>
<td>12</td>
</tr>
<tr>
<td>Concentration: Cyber Operations</td>
<td>Concentration: Cyber Operations</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>• CSE 6363 Software Reverse Engineering</td>
<td></td>
</tr>
<tr>
<td>• CSE 8713 Advanced Cyber Operations</td>
<td></td>
</tr>
<tr>
<td>• ECE 8823 Wireless Networks</td>
<td>• CSE 8713 Advanced Cyber Operations</td>
</tr>
<tr>
<td></td>
<td>• Advanced Cyber Operations electives</td>
</tr>
<tr>
<td>Thesis or Non-Thesis Option</td>
<td>Thesis or Non-Thesis Option</td>
</tr>
<tr>
<td>• Thesis Option: CSE 8000 Thesis Research/Thesis in Computer Science and Engineering: 6 hours</td>
<td></td>
</tr>
<tr>
<td>• Non-Thesis Option: 6 hours of CSE or ECE electives</td>
<td>• Thesis Option: CSE 8000 Thesis Research/Thesis in Computer Science and Engineering: 6 hours</td>
</tr>
<tr>
<td></td>
<td>• Non-Thesis Option: 6 hours of CSE or ECE electives</td>
</tr>
<tr>
<td>Total Hours</td>
<td>Total Hours</td>
</tr>
<tr>
<td>31</td>
<td>31</td>
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</tbody>
</table>

3. Justification and Student Learning Outcomes

Primarily, these changes address the fact that this program is over specified in terms of courses: Only 6 of the 31 credit hours have any flexibility for one concentration (12/31 for the other). This makes it difficult for students to graduate in a timely fashion due to faculty time constraints. A live list of relevant courses to each concentration will be kept in our Graduate Handbook for students to satisfy their degree programs.

**Admission Changes:** To identify our degree as an engineering focused Cyber degree, we have added the requirement for a theory course to the degree for admission. This is in line with other Peer/Peer+ programs and allows our CYSO students more options when choosing CS electives that have those as a requirement. This information will be kept up to date in our Graduate Handbook.

4. Support

A letter of support from the Graduate Coordinator of the Department of Computer Science and Engineering is attached.

5. Proposed 4-Letter Abbreviation

The MSU registrar has adopted CYSO as the abbreviation of Cyber Operation degrees.

6. Effective Date

Spring 2019
November 7, 2018

University Committee on Courses & Curricula  
218 Garner Hall  
Mailstop 9702  
Mississippi State University

UCCC Committee,

With this letter, the Department of Computer Science & Engineering requests changes to the admission requirements for our CS MS & PhD degrees and our CYSO MS degree. Similarly, we request changing the structure in terms of courses required for all three degrees to better serve our students and ensure they graduate in a timely fashion. Edits and classifications to our Catalog entries are also provided. These modifications were approved by the faculty of Computer Science & Engineering at our faculty meeting on Thursday, November 1st, 2018.

Please do not hesitate to contact me if additional information is needed.

Sincerely yours,

Dr. T.J. Jankun-Kelly  
Director of Graduate Studies
November 5, 2018

University Committee on Courses and Curricula
PO Box 5268
Mississippi State, MS 39762

Dr. Franz:

Please find attached a proposal to modify the MS degree in Cyber Security and Operations. The Computer Science and Engineering faculty voted unanimously to approve this addition at the faculty meeting on November 2, 2018.

Please feel free to contact me if there are any questions or concerns.

Sincerely,

[Signature]

Andy D. Perkins, Ph.D.
CSE Courses and Curricula Chair
Associate Professor

[Signature]

Christopher Archibald, Ph.D.
CSE Courses and Curricula Member
Assistant Professor

[Signature]

Joseph Crumpton, Ph.D.
CSE Courses and Curricula Member
Assistant Clinical Professor

[Signature]

Christopher McDaniel
CSE Courses and Curricula Member
Instructor