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Foreword

As part of the University of Colorado Boulder, the Technology, Cybersecurity and Policy (TCP) program accepts students from a broad range of fields and offers curriculum and coursework that creates bridges across disciplinary boundaries. The program views cybersecurity from an interdisciplinary perspective that includes aspects of technology, engineering, secure communications, leadership, policy, and applications to emerging technology areas. By collaborating with multiple units at the University of Colorado Boulder, TCP is creating a new higher education model that is forward looking and interdisciplinary. Among the goals of TCP are to accelerate both research and learning in areas of technology, cybersecurity, and policy; to provide relevant content with experiential learning; and to prepare students to be future leaders in these critical areas.

Honor Code Pledge

The University of Colorado Boulder is dedicated to maintaining the highest standards of intellectual honesty. Commitment to these standards is the responsibility of every student, faculty and staff member. Here is a link to the Honor Code which was designed to uphold CU Boulder’s standards of academic integrity and intellectual honesty. All students of the University of Colorado Boulder are subject to the Honor Code for academic matters.

“On my honor, as a University of Colorado Boulder student, I have neither given nor received unauthorized assistance.”

Colorado Creed

The Colorado Creed is a social responsibility code. It is a way of life and a reminder to act with honor, integrity, and respect.

“As a member of the Boulder community and the University of Colorado Boulder, I agree to:

❖ Act with honor, integrity, and accountability in my interactions with students, faculty, staff, and neighbors.
❖ Respect the rights of others and accept our differences.
❖ Contribute to the greater good of this community.

I will strive to uphold these principles in all aspects of my collegiate experience and beyond.”
# MS in TCP Curriculum Overview

<table>
<thead>
<tr>
<th>Course Requirements</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 TCP Seminar Courses - 2 one-credit courses of expert presentations and professional networking</td>
<td>2</td>
</tr>
<tr>
<td>3 Core Courses - 1 course in each TCP Core area:</td>
<td></td>
</tr>
<tr>
<td>● Core Course in <em>Cybersecurity and Emerging Technologies</em></td>
<td>3</td>
</tr>
<tr>
<td>● Core Course in <em>Technology, Thought Leadership and Policy</em></td>
<td>3</td>
</tr>
<tr>
<td>● Core Course in <em>Networking and Secure Communications</em></td>
<td>3</td>
</tr>
<tr>
<td>5 Depth Area Courses - 5 Elective courses within a depth area: Cybersecurity Engineering, Secure Communications, or Custom</td>
<td>15</td>
</tr>
<tr>
<td>Interdisciplinary Capstone - Two semesters of substantial graduate project work solving problems for industry, defense, government, etc.</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total Required Credits</strong></td>
<td><strong>32</strong></td>
</tr>
</tbody>
</table>
TCP Seminar

The TCP seminar is a one-credit course intended to introduce students to a variety of topics in technology, cybersecurity and policy. This weekly seminar brings in experts from around the world, helping students gain a better understanding of the field and hearing directly from experts in technology, cybersecurity, and policy. Students are required to enroll in the one-credit seminar for their first and second semesters, for a total of two credits. Goals of the seminar include: facilitating understanding of emerging areas in technology, cybersecurity, and policy; developing critiques and narratives of these areas; and enhancing their communication skills.

TCP Core Courses

The TCP program has three Core areas: (i) Cybersecurity and Emerging Technologies, (ii) Technology, Thought Leadership and Policy, and (iii) Networking and Secure Communications. These three areas form the cornerstones of the TCP degree, and students are required to complete the three courses listed below to explore each area. These areas cover the skills needed to become a leader in Technology, Cybersecurity and Policy and ensures graduates have the technical, policy, and strategy skills to work in industry and advance to senior leadership levels. The three Core courses contribute 9 credit hours to the overall degree program.

1. CYBR 5300: Introduction to Cybersecurity
   Introduces students to the key concepts in the design and use of cybersecurity techniques to protect individuals, corporations, and nations.

2. CYBR 5830-002: Becoming a Technology Leader
   Introduces students to the key concepts in technology strategy and management and technology policy as well as its use in both industry and government.

3. CYBR 5010: Fundamentals of Data Communication
   Introduces students to the underlying technologies involved in networked systems and secure data communications between computers and other hosts.
TCP Depth Areas

TCP’s advanced courses allow students to gain deeper knowledge and focus in the area of their choosing. Students must select a depth area and complete the 15 credit (5 course) requirement associated with that depth area. Two depth areas are currently available.

- **Cybersecurity Engineering**
  Students pursuing this depth area must fulfill the following course requirements:
  - 4 Required Courses
    - CYBR 5320: Cybersecurity Network Analytics
    - CYBR 5330: Digital Forensics
    - CYBR 5350: Security Auditing and Penetration Testing
    - CYBR 5830: Special Topics: Software Reverse Engineering
  - 1 Advanced Elective Option
    - CYBR 5310: Immersive Cyber Defense
    - CYBR 5830: Special Topics: Introduction to Blockchain
    - CSCI 5413: Computer Security and Ethical Hacking

- **Secure Communications**
  Students pursuing this depth area must fulfill the following course requirements:
  - 4 Required Courses
    - CYBR 5200: Introduction to Wireless Systems
    - CYBR 5220: Wireless Local Area Networks
    - CYBR 6200: Advanced Wireless Lab
    - CYBR 6215: Wireless and Cellular Systems
  - 1 Advanced Elective Option
    - CYBR 5230: Wireless Systems Lab
    - CYBR 5420: Spectrum Management and Policy
    - CYBR 5830: Special Topics: Introduction to Blockchain

- **Custom**
  Students electing to take the Custom Depth Area option must first obtain approval from the TCP Program. Under the Custom Option, students must identify a sequence of 5 graduate courses that form a coherent whole that aligns with a student’s academic goals and their current, and possibly longer-term, career objectives. Approval of the Custom option is not automatic and requires the student to submit a two page proposal showing how the selected courses function as a depth area for the student.
The two-page write-up must be submitted and approved at least two semesters prior to graduation. Specifically, full-time students would submit Custom option proposals before the end of their second semester, which would be reviewed and either approved or denied prior to their third semester.

Students should not take courses in their proposed Custom option until their petition has been approved by the graduate committee. An approved custom depth area is not subject to the rule described below in the section entitled “Taking Courses Outside of TCP”. That is, a student taking courses in an approved custom depth area may take more than six credits of courses outside of TCP.

**Interdisciplinary Capstone**

To complete their interdisciplinary capstone, students will work in teams across two semesters to complete an advanced project that builds on their Core and Depth Area courses. Projects are often done in conjunction with industry partners. Topics are selected based on the combined interests of the students, the faculty, and external partners such as industry and government. All students are required to take the first course of the sequence below. Most students will then move on to take the second course in the sequence but if a student is enrolled in the Designing for Defense class, they can choose to substitute it for the second capstone course (no petition needed). Thus, the three courses that can be used to meet the Interdisciplinary Capstone requirement are:

- CYBR 5700: Graduate Projects I
- CYBR 6700: Graduate Projects II
- CYBR 5550: Designing for Defense

**Research Thesis**

With faculty approval, students may elect to take 6 credits of thesis work (CYBR 6950) in place of the Interdisciplinary Capstone requirement. To complete a thesis, the student must get approval from a faculty member who will serve as their thesis advisor and find two additional faculty members who are able to serve on their thesis committee. Students will work with a faculty advisor to complete a thesis on a topic of mutual interest that includes aspects of the three Core areas. The three-member committee must be approved by the TCP Program and by the Graduate School. The student works primarily with the thesis advisor and provides both a written document
and arranges a presentation (thesis defense/thesis exam) before the thesis examining committee. Examination Report Forms must be filed with the TCP Program at least two weeks prior to the date of your defense (exam). Students must be registered during the semester in which they defend their thesis. Additional information, rules, dates and deadlines, and thesis submission requirements can be found on the Graduate School website. If a student is unable to find a faculty advisor, the student should pursue a capstone project, as outlined above.

For full-time students, the decision whether to pursue the Interdisciplinary Capstone or Thesis must be made prior to the start of the second year. In their third semester, a student will either be enrolled in the Interdisciplinary Capstone sequence or enrolled in the Thesis course sequence. Since both the Interdisciplinary Capstone and Thesis options are two course sequences, switching from Interdisciplinary Capstone to Thesis (or vice versa) is rare and may require one or two additional semesters to complete the degree.

Taking Courses Outside of TCP

Students may take up to six credits (two courses) of courses from areas outside of TCP to substitute courses within their depth area (both required courses or advanced elective courses). Students must gain approval for these two substitutions prior to completing them by submitting a petition to their graduate program advisor for review/approval by the CS graduate committee. Note: In line with standard practice for the CS graduate committee, courses from the following departments are automatically approved: Linguistics, Business, Geography, Physics, Mathematics, Applied Mathematics/STATS, and Information Science.
MS in TCP Timeline

All students must complete the degree requirements within four years from the date of commencing coursework. The option to petition for an additional fifth year is available. TCP offers Fall, Spring, and Summer courses online or in person on varying days and meeting times to allow flexibility for full- or part-time students.

**Full-time students typically complete the degree in two years.** To graduate in two years:
- Students are required to complete the Seminar in their first two semesters.
- Students are encouraged to complete the Core Courses in the first Fall and Spring semesters and must complete the Core Courses by the end of the third semester (excluding Summer sessions).
- Full-time students take either the Interdisciplinary Capstone Sequence or the Thesis Course Sequence in their third and fourth semesters.

**Part-time students can pursue the degree at their own pace.** Students with graduation paths longer than 2 years must take the seminar in the first two semesters and are encouraged to complete the Core Courses before enrolling in Depth Area courses.

### Academic Standards

**Minimum Grades and GPA Requirements**

For any TCP graduate degree, a course grade below B- is unsatisfactory and cannot be counted toward fulfilling any requirements for the degree.

A master’s degree student is required to maintain at least a B (3.00 GPA) average in all work attempted while enrolled in the Graduate School. Any student, who fails to maintain a 3.00 grade point average or to make adequate progress toward completing a degree, as assessed by the student’s academic/research advisor, will be subject to suspension or dismissal from the Graduate School upon consultation with the major department. The final decision on suspension or dismissal will be made by the Dean of the Graduate School. See the [Graduate School Rules](#) for additional information.
Incomplete (I) Grades

An incomplete (I) grade is given only when students, for documented reasons beyond their control, have been unable to complete course requirements in the semester enrolled. A substantial amount of work must have been satisfactorily completed before approval of such a grade is given. The final grade (earned by completing the course requirements or by retaking the course) does not result in deletion of the (I) from the transcript. A second entry is posted on the transcript to show the final grade for the course. At the end of one year, (I) grades for courses that are not completed or repeated are regarded as (F) and are shown as such on the student's transcript. Courses with grades of (I) are not included in computation of grade point averages until a final letter grade has been awarded in that course.
Graduation Checklist

The following Graduate School forms must be submitted to the TCP Program for approval. IMPORTANT: Check the Graduate School deadlines prior to the start of the semester.

**MS Interdisciplinary Capstone Option**

- **Apply to Graduate.** Students must apply through myCUinfo.colorado.edu to graduate. This notifies the Graduate School and your department that you intend to graduate. If you do not complete the requirements for graduation, you must log back in and re-apply to graduate for the new graduation date. You must apply to graduate online whether or not you plan to attend the ceremony.
- **Candidacy Application for Advanced Degree**

**MS Thesis Option**

- **Apply to Graduate.** Students must apply through myCUinfo.colorado.edu to graduate. This notifies the Graduate School and your department that you intend to graduate. If you do not complete the requirements for graduation, you must log back in and re-apply to graduate for the new graduation date. You must apply to graduate online whether or not you plan to attend the ceremony.
- **Candidacy Application for Advanced Degree**
- **Master’s Examination Report**
- **Final Grade Card**
- **Signature Page** – original page with original signatures
- **Final Copy of Thesis** must be submitted online

**Contact Persons**

**Harrison Sloan**  
Graduate Advisor  
TCP Program  
University of Colorado Boulder  
tcpgrad@colorado.edu

**Ken Anderson**  
Department Chair  
Department of Computer Science  
University of Colorado Boulder  
kena@cs.colorado.edu

TCP | TECHNOLOGY, CYBERSECURITY AND POLICY PROGRAM
Appendix A – MS in TCP Degree Planning Form

Name:                      Student ID #:  
CU Email:                  

<table>
<thead>
<tr>
<th>Required Course Areas</th>
<th>Credits</th>
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<tbody>
<tr>
<td>2 Seminar Courses</td>
<td>2</td>
</tr>
<tr>
<td>3 Core Courses</td>
<td>9</td>
</tr>
<tr>
<td>5 Depth Area Courses</td>
<td>15</td>
</tr>
<tr>
<td>Master’s Project or Thesis</td>
<td>6</td>
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<td>Total Required Credit Hours</td>
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Courses satisfying Seminar Requirement:

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<tr>
<th>Semester/Yr.</th>
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<th>Course Title</th>
<th>Credit</th>
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Courses satisfying Core Requirements:

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<tr>
<th>Semester/Yr.</th>
<th>Course #</th>
<th>Course Title</th>
<th>Credit</th>
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Courses satisfying Depth Area Requirements:

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<th>Semester/Yr.</th>
<th>Course #</th>
<th>Course Title</th>
<th>Credit</th>
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Courses satisfying MS Project or Thesis Requirement:

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<th>Course #</th>
<th>Course Title</th>
<th>Credit</th>
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Notes:

Faculty/Academic Advisor Signature:       Date: