The Threads™ represent partial paths through the curriculum. Thus, a student weaves a degree from these Threads. Students are not forced to make Thread decisions very early in their academic careers; however, they may if they want. We define the Threads so they are flexible enough to allow for a variety of technical and creative experiences. Threads are coherent enough that students develop computing skills even if their focus shifts as they go along.

The Theory thread is where computing meets itself. Theory teaches students the theoretical and mathematical foundations underlying a wide range of computational disciplines. Early preparation includes discrete mathematics, algorithms, and complexity. Knowledge goals are for students to mature in development and analysis of abstract models for applications ranging from theoretical computer science to computational physics, biology, mathematics, economics, and optimization.

The Intelligence thread is where computing models intelligence. This thread is concerned with computational models of intelligence from top to bottom. To this end, we emphasize designing and implementing artifacts that exhibit various levels of intelligence as well as understanding and modeling natural cognitive agents such as humans, ants, or bees. Students acquire the technical knowledge and skills necessary for expressing, specifying, understanding, creating, and exploiting computational models that represent cognitive processes. It prepares students for fields as diverse as artificial intelligence, machine learning, perception, and cognitive science, as well as for fields that benefit from applications of techniques from those fields.

### Wellness
- **APPH 1040** Scientific Foundations of Health 2
- or **APPH 10 The Science of Physical Activity and Health**

### Core A - Essential Skills
- **ENGL 1101** English Composition I 3
- **ENGL 1102** English Composition II 3
- **MATH 1552** Integral Calculus 4

### Core B - Institutional Options
- **CS 1301** Introduction to Computing 1 3

### Core C - Humanities
- **Any HUM** (http://www.catalog.gatech.edu/academics/undergraduate/core-curriculum/core-area-c) 6

### Core D - Science, Math, & Technology
- **PHYS 2211** Introductory Physics 1 2 4
- **Lab Science** 2 4
- **MATH 1551** Differential Calculus 2
- **MATH 1554** Linear Algebra 4

### Core E - Social Sciences
- Select one of the following: 3
  - **HIST 2111** The United States to 1877
  - **HIST 2112** The United States since 1877

### Other Required Courses
- **INTA 1200** American Government in Comparative Perspective
- **POL 1101** Government of the United States
- **PUBP 3000** American Constitutional Issues
- **PSYC 1101** General Psychology
- Any SS (http://www.catalog.gatech.edu/academics/undergraduate/core-curriculum/core-area-e) 6

### Core F - Courses Related to Major
- **Lab Science** 2 4
- **CS 1100** Freshman Leap Seminar 1
- **CS 1331** Introduction to Object Oriented Programming 1 3
- **CS 1332** Data Structures and Algorithms for Applications 1 3
- **CS 2050** Introduction to Discrete Mathematics for Computer Science 1 3
  - or **CS 2051** Honors - Induction to Discrete Mathematics for Computer Science
- **MATH 2550** Introduction to Multivariable Calculus 4 2

### Major Requirements
- **CS 2110** Computer Organization and Programming 1 4
- **CS 3510** Design and Analysis of Algorithms 1 3
  - or **CS 3511** Design and Analysis of Algorithms, Honors
- **CS 3600** Introduction to Artificial Intelligence 1 3
- **CS 4510** Automata and Complexity Theory 1 3
- **CS 4540** Advanced Algorithms 1 3
- **MATH 3406** A Second Course in Linear Algebra 1 3
- Select one of the following for Advanced Mathematics: 1 3
  - **MATH 4022** Introduction to Graph Theory
  - **MATH 4032** Combinatorial Analysis
  - **MATH 4150** Introduction to Number Theory
- Select one of the following for Embodied Intelligence: 1 3
  - **CS 3630** Introduction to Perception and Robotics
  - **CS 3790** Introduction to Cognitive Science
  - **PSYC 3040** Sensation and Perception
- Select six credit hours of the following for Approaches to Intelligence: 1 6
  - **CS 4476** Introduction to Computer Vision
  - **CS 4635** Knowledge-Based Artificial Intelligence
  - **CS 4641** Machine Learning
  - **CS 4649** Robot Intelligent Planning
  - **CS 4650** Natural Language Understanding
  - **CS 4731** Game AI

### Junior Design Options (Capstone)
- **Junior Design Option** 1 3 6

### Concentration
- **CS 2110** Computer Organization and Programming 1 4
- **CS 3510** Design and Analysis of Algorithms 1 3
  - or **CS 3511** Design and Analysis of Algorithms, Honors
- **CS 3600** Introduction to Artificial Intelligence 1 3
- **CS 4510** Automata and Complexity Theory 1 3
- **CS 4540** Advanced Algorithms 1 3
- **MATH 3406** A Second Course in Linear Algebra 1 3
- Select one of the following for Advanced Mathematics: 1 3
  - **MATH 4022** Introduction to Graph Theory
  - **MATH 4032** Combinatorial Analysis
  - **MATH 4150** Introduction to Number Theory
- Select one of the following for Embodied Intelligence: 1 3
  - **CS 3630** Introduction to Perception and Robotics
  - **CS 3790** Introduction to Cognitive Science
- Select six credit hours of the following for Approaches to Intelligence: 1 6
  - **CS 4476** Introduction to Computer Vision
  - **CS 4635** Knowledge-Based Artificial Intelligence
  - **CS 4641** Machine Learning
  - **CS 4649** Robot Intelligent Planning
  - **CS 4650** Natural Language Understanding
  - **CS 4731** Game AI

### Other Required Courses
- **MATH 3012** Applied Combinatorics 3
- Select one of the following: 3
  - **MATH 3215** Introduction to Probability and Statistics
  - **MATH 3670** Probability and Statistics with Applications
Pass-fail only allowed for Free Electives (max 6 credit hours), CS 1100, and CS 1171 (if required).  

1. Minimum grade of C required.  
2. Two of three lab sciences MUST be a sequence.  
3. Junior Design Options are as follows (students must pick one option and may not change):  
   - Option 1 - LMC 3432, LMC 3431, CS 3311, CS 3312.  
   - Option 2 - ECE VIP courses and LMC 3403.  
   - Option 3 - Satisfy Georgia Tech Research Option.  

Six credits of the Junior Design option are used as Major Requirements and the average credits of research/VIP (5 credit hours/2 credit hours) may be used as free electives. Students completing VIP for their junior design requirement will be required to complete at least three semesters of VIP. (VIP 1 + VIP 2 + VIP 3) (for a total of 5 credit hours) + LMC 3403 = 8 hours of VIP credit.  

Two credit hours of MATH 1554 may count along with MATH 2550 to give Area F 18 credit hours.  

Cooperative Programs  
The College of Computing participates in the undergraduate and graduate Cooperative Programs. See links below for further Information:  

- Undergraduate Cooperative Plan (http://catalog.gatech.edu/academics-special-academic-programs-experiential-education-center-career-discovery-development)  
- Graduate Cooperative Plan (http://catalog.gatech.edu/academics-special-academic-programs-experiential-education/graduate-cooperative-plan)  

International Plan  
The College of Computing (http://www.cc.gatech.edu) has an approved BS CS International Plan that accommodates the unique requirements of this option discussed in the International Plan section of the catalog (http://www.catalog.gatech.edu/academics-special-academic-programs/international-plan).  

However, due to the flexible nature of the Threads curriculum, the International Plan designation may not be available with all of the Thread combinations. Efforts will be made to work with interested students to accommodate their individual circumstances with regard to the International Plan designator for the Bachelor of Science in Computer Science.  

Research Option  
To complete the Research Option in the College of Computing, students must:  

1. Complete at least nine units of undergraduate research  
   a. Over at least two, preferably three terms  
   b. Research may be for either pay or credit;  
   2. Write an undergraduate thesis/report of research on their findings;  
   3. Take  
      a. LMC 4701: Undergraduate Research Proposal Writing (taken during the first or second semester of research)  
      b. LMC 4702: Undergraduate Research Thesis Writing (taken during the thesis writing semester).  

Research Classes  
The following classes count toward fulfillment of the Research Option:  

<table>
<thead>
<tr>
<th>Research for Credit</th>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2699</td>
<td></td>
<td>Undergraduate Research (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4699</td>
<td></td>
<td>Undergraduate Research (Junior and Senior)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4980</td>
<td></td>
<td>Research Capstone Project</td>
<td>1-21</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Research for Pay (Audit only)</th>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2698</td>
<td></td>
<td>Undergraduate Research Assistantship (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4698</td>
<td></td>
<td>Undergraduate Research Assistantship (Junior and Senior)</td>
<td>1-12</td>
</tr>
</tbody>
</table>

To get credit toward completion of the Research Option for research for pay, students must be registered for the appropriate audit-only, research for pay class (CS 2698 or 4698). If work on research for pay begins after the close of registration and the student has not signed up for the appropriate class, unfortunately it is not possible to get credit toward the Research Option for work that term.  

A research project will also fulfill the capstone design requirement if the student registers for CS 4980 for one of the research terms. This is typically done the last semester of research, while taking LMC 4702.  

Completion of the Research Option is noted on the student’s transcript. For more information, see www.urop.gatech.edu (http://www.urop.gatech.edu).  

Contact Us  
General Research Option Information (http://www.catalog.gatech.edu/academics-special-academic-programs/undergraduate-research-opportunities-program)