Undergraduate Programs

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Data Science Major: Update

• Proposal at April 2016 BOV Meeting: 3 separate Data Science programs
  ➢ Computational Analytics
  ➢ Modeling Physical Systems
  ➢ Genomics
• Proposal re-worked as a single B.S. degree with three concentrations
  ➢ Computational Analytics
  ➢ Computation & Modeling
  ➢ Genomics & Bioinformatics
• A minor degree program in Data Science: Computational Analytics was also created

These new programs were approved by the Board of Trustees on Oct. 11, 2016
Data Science Major: Course Grids

• Common core in Year 1 with fundamental CIS and Math courses

<table>
<thead>
<tr>
<th>Freshman – Fall (15 cr.)</th>
<th>Freshman – Spring (15 cr.)</th>
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<tbody>
<tr>
<td>CIS 1068 Program Design and Abstraction (4 cr.)</td>
<td>CIS 1166 Mathematical Concepts in Computing I (4 cr.)</td>
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<tr>
<td>Math 1041 Calculus I (4 cr.)</td>
<td>Math 1042 Calculus II (4 cr.)</td>
</tr>
<tr>
<td>Gen Ed English 0802 (4 cr.)</td>
<td>Gen Ed IH 0851 (3 cr.)</td>
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<tr>
<td>Gen Ed Human Behavior (3 cr.)</td>
<td>Gen Ed US Society (3 cr.)</td>
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<tr>
<td>Elective (1 cr.)</td>
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• Decision point in Fall of Year 2 with Chemistry, Math, and Physics courses

Concentration in Computational Analytics

<table>
<thead>
<tr>
<th>Sophomore – Fall (16 cr.)</th>
<th>Sophomore – Spring (16 cr.)</th>
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<tbody>
<tr>
<td>Chem 1031&amp;1033 General Chemistry I (3+1 cr.) OR Phys 1061 (4 cr.) Elementary Classical Physics I (or variants)</td>
<td>Chem 1032&amp;1034 General Chemistry II (3+1 cr.) OR Phys 1062 (4 cr.) Elementary Classical Physics II (or variants) NOTE Must be continuation</td>
</tr>
<tr>
<td>CIS 2168 Data Structures (4 cr.)</td>
<td>CIS 3715 Principles of Data Science (4 cr.)</td>
</tr>
<tr>
<td>CIS 2166 Mathematical Concepts in Computing I (4 cr.)</td>
<td>CIS 2107 Computer Systems and Low-Level Programming (4 cr.)</td>
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<tr>
<td>Math 2043 Calculus III (4 cr.)</td>
<td>CIS 3223 Data Structures and Algorithms (4 cr.)</td>
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</table>
Data Science Major: Course Grids

- Specialization in Years 3-4
- Common writing-intensive capstone course in Spring of Year 4

### Concentration in Computational Analytics

<table>
<thead>
<tr>
<th>Semester</th>
<th>Courses</th>
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</table>
| **Junior – Fall** (15 cr.) | Math 3031 Probability Theory I (3 cr.)  
Math 3045F Differential Equations with Linear Algebra (4 cr.) or Math 2101 Linear Algebra (3 cr.) or Math 2103F Linear Algebra with Lab (4 cr.)  
CIS 4331F Principles of Database Systems (4cr.)  
Gen Ed Arts (3-4 cr.)  
Elective (1-2 cr.) |
| **Junior – Spring** (16 cr.) | Math 3032S Mathematical Statistics (3 cr.)  
CIS 4517S Data-Intensive and Cloud Computing (4 cr.)  
Gen Ed IH 0852 (3 cr.)  
Gen Ed World Society (3 cr.)  
Gen Ed Race (3 cr.) |
| **Senior – Fall** (15 cr.) | CIS 4526F Foundations of Machine Learning (3 cr.)  
DS: Computational Elective (3 cr.)*  
DS: Computational Elective (3 cr.)*  
Electives (6 cr.) |
| **Senior – Spring** (15 cr.) | SCTC5 xx96 Advanced Data Visualization (3 cr.)  
Eng 2696 Technical Writing (3 cr.)  
DS: Computational Elective (3 cr.)*  
Electives (6 cr.) |

* as specified by concentration
Entrance Requirements for CST Majors

• For incoming freshmen, lower math SAT and ACT scores are associated with lower rates of retention in CST degree programs.

• Target students who place in lower level Math courses (Basic-College Algebra) and thus do not meet the pre-reqs for fundamental science requirements for CST majors.

• Enroll these students in an introductory science course to provide academic support and mentoring in a STEM Learning Community.

How to put these plans into practice?
Entrance Requirements for CST Majors

• Set minimum entrance requirements for CST Majors: SAT Math OR ACT Math OR TU Admissions Rating Score Total (for Temple Option students admitted with no test scores)
• Students who do not meet at least one of the minimum requirements will be admitted to CST as Natural Sciences majors
  ➢ B.A. in Natural Sciences is an existing degree program
  ➢ Change program array to require a supportive introductory science course, SCTC 1501, in the first semester
• Students may switch into other CST majors beginning in the second semester, based on departmental criteria

Working with Admissions and Provost’s Office to apply entrance requirements to a subset of the 2017 CST admitted student population
Entrance Requirements for CST Majors

- Average scores for CST freshmen entering FA15 (similar for FA16)
  - SAT Math = 591
  - ACT Math = 26.5
  - Admissions Rating Score = 67
- Recommended suggested cutoffs based on analysis of CST retention rates vs test scores (total and math sub-scores)
- Admissions Rating Score cutoff needed for students admitted via Temple Option (no test scores required)

<table>
<thead>
<tr>
<th>Test/Rating Type (Total Possible Score)</th>
<th>Suggested Cutoffs</th>
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<tbody>
<tr>
<td>SAT Math (800)</td>
<td>490</td>
</tr>
<tr>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>ACT Math (36)</td>
<td>22</td>
</tr>
<tr>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>TU Admissions Rating Score Total (100)</td>
<td>60</td>
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</table>
A new student driven program to replace DARS (degree audit system) will have advantages over current system.

- Students will build their own academic plan based on a “roadmap” of suggested courses derived from the undergraduate bulletin.
- Make semester by semester changes and assess progress within their major.
- Streamline the fly-in-four check-in process by enabling students to submit online to their advisors.
- Derive reports to help predict enrollments and the need for future course offerings.