This report describes activity of the School of Engineering Curriculum Committee (SoE-CC) over the period from May 22, 2018 through May 31, 2019.

Course Approvals and Modifications
46 new courses and course modifications were approved by the SoE-CC. Most changes were submitted to the SoE Faculty and approved via consent agenda. Ten ME courses (ME10, 11, 20, 21, 30, 31, 40, 41, 50, and 51) were approved via an SoE Faculty meeting vote, since these courses would remove BSME students from foundation electives taught by other departments.

Courses impacted include:

- BME 62
- BME 262
- CEE 59
- CEE 105
- CEE 106
- CEE 120
- COMP 12
- COMP 13
- COMP 21
- COMP 23
- COMP 27
- COMP 51
- COMP 52
- COMP 53
- COMP 133
- COMP 137
- COMP 138
- COMP 139
- COMP 151
- COMP 152
- COMP 153
- COMP 155
In addition to the changes above, 41 ME courses were renumbered with no change to title, attributes or description. A thorough transition plan was filed by the ME Department to detail how the course renumbering will impact graduation requirements during the transition between old and new degree sheets. The full transition plan is included as an Appendix to this report. The list of the 41 renumbered courses can be found in Table 1 of the Appendix.

**Bulletin Change**

The SoE-CC presented two Bulletin amendments to the SoE faculty. The first amendment was originally proposed by Chris Swan, Dean of Undergraduate Education. This first amendment modified the ES 2 requirement to allow COMP 11 as an alternative. The intent of the change was in part to resolve an enrollment issue, in that more students need to take ES2 each year than the number of seats available. The change also addressed a curricular issue, in that COMP11 is a preferable introductory computation course for some majors, notably for BSCS majors. The specific language of the change is:

*Language to be modified under "Introductory Course Requirement"
Delete: "e. Introduction to Computing in Engineering, ES 2"
Replace with: "e. Introductory Computing (at least one of ES 2 or COMP 11)"*
A second change introduced an official rule for the number of internship credits that may be counted toward the degree. Previously there was a limit of 1 course-credit of internship. Practically speaking, in the pre-SHU era, the old policy limited students to applying to 0.5 course-credit internships to the degree, with the practical implication that international students could pursue at most two internships under Curricular Practical Training (CPT). This rule was published on CPT forms, but was never introduced into the Bulletin.

The new internship rule (below) was aimed to clarify the internship limit, to generalize the limit to more clearly apply to all students, to update the old rule for the SHU era, and to codify the rule clearly in the Bulletin.

**New language to be added to "Undergraduate Internship Programs"

Engineering students are encouraged to pursue curricular and extra-curricular work experiences. However, each engineering student is limited to enroll in 3 credits of internship, at most, totaled over the undergraduate program. For an international engineering student to engage in Curricular Practical Training (CPT), the student must be registered for a co-op or be enrolled in a one-or-more credit internship concurrent with the CPT experience.

Both rules were approved by the full SoE Faculty at the faculty meeting on March 13, 2019.

**New Process for Consent Agenda**

In response to a reduced number of SoE Faculty Meetings scheduled in the 2018-2019 academic year, the SoE-CC voted to modify its procedure for approving consent agendas, allowing for an entirely electronic approval of the consent agenda. The updated guidance for the consent agenda is included below (and is also available publicly on the SoE-CC web site).

*Once the SOECC approves a request, the SOECC chair classifies it as part of the regular or consent agenda of the next available SOE faculty meeting.*

- A request included in the regular agenda is one the SOECC chair considers to have potential for impact on SOE as a whole, regardless of its details. Regular agenda items include all changes to programs. These items also include any requests the SOECC found to be controversial.

- A request included in the consent agenda is a course modification or new course proposal approved without dissent by the SOECC.

*After each of its meetings, the School of Engineering Curriculum Committee (SoE-CC) will prepare a consent agenda for electronic distribution to the SoE Faculty. The consent agenda will comprise all new and modified courses approved with no opposing votes. The SoE Faculty will be given a review period lasting one week after the distribution date. During the review period, any voting member of the SoE Faculty may write to the SoE-CC chair with a request to remove one or more courses from the consent agenda. At the end of the week, all courses remaining on the consent agenda will be transmitted to the Registrar for inclusion in the Tufts online catalog. (Removed courses will be brought to an SoE Faculty meeting for further discussion and, if appropriate, a vote.)*
If any member of the SoE-CC opposes a course proposal, that proposal cannot be placed on the consent agenda. Instead, the proposal will be returned to the sponsoring Department with feedback, so that the sponsoring Department has an opportunity to revise and resubmit. If the SoE-CC vote remains split after such a revision, the SoE-CC may decide by majority vote to send the course to a full SoE Faculty meeting for further discussion and, if appropriate, for a vote.

New program proposals cannot be placed on the consent agenda. If approved by the SoE-CC, new program proposals are sent to the SoE Faculty for further discussion and, if appropriate, for a vote. Note: Prior to being sent to the SoE Faculty, new program proposals must be approved by the SoE Dean. If approved by the Dean, by the SoE Faculty, and (in a parallel review process) by the Provost, new programs will be submitted to the Trustees for final approval. A full description of the provost review policy may be found at https://provost.tufts.edu/policies/guidelines-for-proposing-new-academic-programs/ Consent agenda approvals will be archived with the agenda of the following SoE faculty meeting.

MSE Program
The Committee unanimously approved a new academic unit titled Materials Science and Engineering (MSE). The term academic unit is used by the Registrar to describe a course designation in SIS. Courses can now be listed as MSE courses by the Registrar at the request of the MSE Program Director. Initially, it is expected that MSE courses will all be cross-listed courses, providing an MSE designation to courses already offered by other departments. Eventually, if resources are made available by the Dean of Engineering, it may be possible to create new courses with their primary listings in MSE. Based on the SoE-CC recommendation, the full SoE Faculty approved the new academic unit on March 13, 2019.

Notably, the new MSE academic unit is one of the few in SoE not specifically associated with a department. (Currently, the only other such designations are the ES and EN designations.)

Geosystems Engineering Minor
The Civil and Environmental Engineering Department proposed the Geosystems Engineering Minor as an update to (and replacement for) the Geoengineering Minor. The proposal was approved by the SoE-CC and subsequently by the full SoE faculty. A brief description of the minor follows.

The Department of Civil and Environmental Engineering offers non-CEE students a five course minor in Geosystems Engineering. This minor provides students an opportunity to study engineering topics related to soils and water. Course requirements for the Geosystems Engineering Minor have prerequisites of MATH 32, CHEM 1, PHY 11. The minor comprises
three required courses and two electives. Students pursuing the minor can select between a soils track in which the required courses are ES5, ES9, CEE42, and water track in which the required courses are CEE32, ES8, CEE12. The two elective courses must be selected from the approved list or by petition to the faculty coordinator for the minor.

Entrepreneurship Minor
The Tufts Gordon Institute (TGI) requested a name change for the Entrepreneurial Leadership Studies (ELS) minor. The new name is the Entrepreneurship Minor. TGI would also like to create a new academic unit, titled Entrepreneurship (ENT). All existing ELS courses would be relabeled as ENT courses (with the same number, attributes, and descriptions). The ELS academic unit would then be retired and the ELS course label deleted.

The SoE-CC tentatively approved this change, subject to the creation of a detailed transition plan describing the impact of the change on students and detailing how rules would be interpreted during the transition years (e.g. for students who may have started but not finished the existing ELS minor). Specifically, the SoE-CC approved both the creation of the ENT academic unit and the ENT minor, subject to review and approval of the transition plan by a subcommittee consisting of Jason Rife and Jennifer Stephan. If approved by the subcommittee, the matter will still need final approval through a vote at a Full SoE Faculty meeting.

Current status: A transition plan is in preparation by TGI.

Breakout Discussions
During the 2018-2019 academic year, the SoE-CC hosted monthly breakout sessions to discuss updating Bulletin requirements. The goal is to adapt requirements to better fit our vision of the future engineering undergraduate, while also patching problems that appeared during the conversion from course credits to semester-hour units (SHUs). The SoE-CC is currently working to craft several requirements, which the Committee intends to bring to the full SoE Faculty in Fall 2019. The Bulletin changes being drafted include:

1) Introduction of a new limit restricting students to (at most) two minors; removal of existing double-counting rules for minors.
2) Fusion of the Foundation and Concentration requirements into one category of department-specified courses. (The category would be labeled Major requirements.)
3) Update of the HASS category, expanding the category to require more SHUs but also to allow more courses. (The category would be relabeled Liberal Studies.)
4) Redefinition of the Free Electives category, such that Free Electives would include any courses taken simply to fulfill the total credit requirement (of 120 SHU), but not otherwise needed to fulfill a specific course requirement.
Course Deletions
Based on Departmental requests, the following courses were removed from the Catalog.

- BME 162  Molecular Biotechnology
- CEE 1  Introduction to Civil and Environmental Engineering
- CHBE 162  Molecular Biotechnology
- EE 95  Special Projects
- EE 96  Special Projects
- ME124  Fracture Mechanics
- ME132  Scanning Probe Microscopy
- ME149  Special Topics in Engineering
- ME168  Seminar in Fluid Mechanics and Heat Transfer
- ME194  Special Topics
- ME197  Special Topics: Study Abroad
- ME225  Advanced Structural Dynamics
- ME232  Scanning Probe Microscopy
- ME280  Advanced Engineering Controls
- ME294  Special Topics
- ME295  Master’s Thesis
- ME298  Graduate Research
- ENP 294  Special Topics
- ENP 295  Thesis

Appendix: Mechanical Engineering Transition Plan

ME Course Renumbering
Given the recent approval of our new undergraduate core curriculum, the Department of Mechanical Engineering requests that all existing courses be renumbered to accurately reflect the new “pillar” structure put in place by our undergraduate curriculum. The courses will be organized by topic in the following blocks at the 000, 100 and 200 levels:

- x0x Series – Mathematics
- x1x Series – Materials & Manufacturing
- x2x Series – Mechanics
- x3x Series – Electromechanical Systems and Robotics
- x4x Series – Engineering Design
- x5x Series – Thermal Fluid Systems
- x6x Series – Human Factors
- x7x Series – Interdisciplinary
The department is requesting that renumbering of existing courses should occur over a single academic year (with a few exceptions for courses offered on a biannual basis). Numbers will be re-used, and we feel that one single transition will reduce confusion as compared to a gradual transition over multiple years. We outline our transition plan in the following pages.

**Phases of Transition**

The department proposes a 3-phase approach to renumbering. This document considers only Phase 1.

**Phase 1: Renumber existing ME courses for which no title or description changes are needed (table 1). Delete unused courses (table 2). Correct pre-requisites, recommendations, and cross listing that reference changed course numbers (table 3). If approved, these changes will be implemented for Spring 2020.**

**Phase 2: Renumber existing ME courses that require title or description changes. Renumber courses that impact the undergraduate degree sheet (ME18 and ME43). The Phase 2 proposal will be submitted in Fall 2019; if approved, Phase 2 changes will be implemented in Spring 2020.**

**Phase 3: Renumber ME courses that will be offered with changes. The Phase 3 proposal will be submitted in Spring 2020; if approved, Phase 3 changes will be implemented in Fall 2020.**

**Phase 1 Requested Changes**

Courses in the list below were renumbered (with no changes to description, title, or attributes).

| **Table 1. Re-numbering List** |
|-----------------------------|-----------------------------|
| **Current Number** | **Title** | **New Number** |
| ME-0084 | Introductory Robotics and Mechatronics | ME-0035 |
| ME-0073 | Musical Instrument Design and Manufacture | ME-0045 |
| ME-0150 | Applied Mathematics for Engineers | ME-0100 |
| ME-0108 | Statistical Quality Control | ME-0102 |
| ME-0125 | Manufacturing Processes and Materials Technology | ME-0110 |
| ME-0127 | Theory and Applications of Polymer Materials and Processing | ME-0114 |
| ME-0126 | Computer-Integrated Engineering | ME-0113 |
| ME-0123 | Mechanics of Composite and Heterogeneous Materials | ME-0116 |
| ME-0121 | Biomaterials | ME-0117 |
| ME-0122 | Solid Mechanics | ME-0120 |
| ME-0181 | Advanced Dynamics | ME-0121 |
Phase 1 Cross-lists
Since all courses will maintain their unique catalog identifier in SIS, all cross-list relationships will be automatically updated to cross-list with the new course number. Courses from other departments that will be cross-listed with new ME numbers are presented in table 2.

Table 2. Cross-Listed Course Changes

<table>
<thead>
<tr>
<th>Course</th>
<th>Current ME Cross-List</th>
<th>New ME Cross-List</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES-0073</td>
<td>ME-0073</td>
<td>ME-0045</td>
</tr>
<tr>
<td>CHBE-0111</td>
<td>ME-0111</td>
<td>ME-0150</td>
</tr>
</tbody>
</table>
Also, a **new cross listing** will be established to link ME101 and ES101.

### Phase 1 Reuse of Course Numbers

In this re-numbering effort, we will be re-using numbers immediately that have previously been used for other courses. The list of these re-used numbers is below in table 3.

<table>
<thead>
<tr>
<th>Course #</th>
<th>Current Course</th>
<th>New Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME-0102</td>
<td>Inventive Design</td>
<td>Statistical Quality Control</td>
</tr>
<tr>
<td>ME-0110</td>
<td>Thermal Management Of Electronics</td>
<td>Manufacturing Processes And Materials Technology</td>
</tr>
<tr>
<td>ME-0116</td>
<td>Mass Transfer And Phase Transformations In Materials Processing</td>
<td>Mechanics Of Composite And Heterogeneous Materials</td>
</tr>
<tr>
<td>ME-0117</td>
<td>Microfluidics</td>
<td>Biomaterials</td>
</tr>
<tr>
<td>ME-0121</td>
<td>Biomaterials</td>
<td>Advanced Dynamics</td>
</tr>
<tr>
<td>ME-0122</td>
<td>Solid Mechanics</td>
<td>Advanced Vibrations</td>
</tr>
<tr>
<td>ME-0123</td>
<td>Mechanics Of Composite And Heterogeneous Materials</td>
<td>Biomechanics</td>
</tr>
<tr>
<td>ME-0124</td>
<td>Fracture Mechanics</td>
<td>Forces at Nanoscale</td>
</tr>
<tr>
<td>ME-0125</td>
<td>Manufacturing Processes And Materials Technology</td>
<td>Mechanics of Materials at the Micro &amp; Nano Scale</td>
</tr>
<tr>
<td>ME-0126</td>
<td>Computer-Integrated Engineering</td>
<td>Acoustics</td>
</tr>
<tr>
<td>ME-0130</td>
<td>Mechanics of Materials at the Micro &amp; Nano Scale</td>
<td>Digital Control Of Dynamic Systems</td>
</tr>
<tr>
<td>ME-0145</td>
<td>Power Generation Systems</td>
<td>Engineering Education Design</td>
</tr>
<tr>
<td>ME-0150</td>
<td>Applied Mathematics For Engineers</td>
<td>Thermal-fluid Transport I</td>
</tr>
<tr>
<td>ME-0171</td>
<td>Engineering Education Design</td>
<td>Advanced Data Acquisition And Image Processing</td>
</tr>
<tr>
<td>ME-0225</td>
<td>Advanced Structural Dynamics</td>
<td>Mechanics of Materials at the Micro &amp; Nano Scale</td>
</tr>
<tr>
<td>ME-0294</td>
<td>Special Topics</td>
<td>Master of Engineering Project</td>
</tr>
<tr>
<td>ME-0298</td>
<td>Graduate Research</td>
<td>Doctoral Thesis</td>
</tr>
</tbody>
</table>

We have spoken with the registrar’s office and confirmed that all the courses will maintain their hidden unique SIS catalog number. As such, students will not be able to repeat the same course for credit even if it has two different numbers during their time at Tufts. If students attempt to enroll in the same course with a new number, they will receive the following alert:
“This course has been taken previously. You may add this class but you have reached the repeatable limit. Verify that the class will apply toward your course of study.”

We will send an email to all of our students notifying them that this message means they will not be able to count the course a second time for credit. After course registration for the spring 2020 and fall 2020 semesters, Briana Bouchard will audit all MS students’ transcripts to confirm nobody has accidentally enrolled in a repeated course.

Conversely, students will be able to take the same course number twice if they took it once before the numbering change and take the new course with the same number after the numbering change. For example, if a student took “ME-0125 Manufacturing Processes and Materials Technology” prior to the number change and would like to enroll in “ME-0125 Mechanics of Materials at the Micro & Nano Scale,” SIS will allow them to do so.

To reduce confusion for the students, we will be posting table 1, which will serve as a conversion matrix of old courses to new courses, on our department Canvas site so students can see what has changed. This file will be live for three full academic years to ensure that all straddle students have graduated before it is removed. The following text will accompany the table:

“As of spring 2020, all courses in the Department of Mechanical Engineering have been re-numbered to match our new pillar structure. Below you will find a conversion matrix that shows the old numbers for all of the courses and their new numbers, as of spring 2020. Please keep in mind, you cannot receive credit for the same course title twice even if it has two different numbers. Conversely, you may take the same course number twice as long as the course title and content are different.”

During transition years, transfer of credit requests will be double checked to verify that the requested equivalent course number matches the correct title under the new numbering system.

Phase 1 Number Change Impact on MS and PHD Requirements

Our graduate programs in ME (MS & PhD) require students to complete two core sequences (2 courses per core, 5 cores available, 10 courses total) as well as one restricted mathematics elective (3 course options). While students generally complete their cores and math elective within their first year of study, some continuing students may not and may be partially through their core requirements when number changes go into effect. We plan to create a new page on the ME website for each program that will provide transition requirements for these students. Below is an example of how we plan to modify our existing website text for these students (https://engineering.tufts.edu/me/current/phd/me/bs-requirements):

1. Breadth of Technical Exposure (4 courses, 12 SHUs):

Choose 2 out of the 5 core sequences:
• **Core 1. Fluid Dynamics & Heat Transfer**
  o Core 1A. ME 150 Thermal Fluid Transport I
    ▪ (Core 1A is fulfilled by ME 111 Thermal Fluid Transport I if taken prior to Spring 2020)
  o Core 1B. ME 151 Thermal Fluid Transport II
    ▪ (Core 1B is fulfilled by ME 112 Thermal Fluid Transport II if taken prior to Spring 2020)

• **Core 2. Dynamics & Controls**
  o Core 2A. ME 0130 Digital Control of Dynamic Systems
    ▪ (Core 2A is fulfilled by ME 180 Digital Control of Dynamic Systems if taken prior to Spring 2020)
  o Core 2B. ME 121 Advanced Dynamics and Vibrations
    ▪ (2020 Core 2B is fulfilled by ME 181 Advanced Dynamics and Vibrations if taken prior to Spring 2020)

• **Core 3. Material Mechanics & Processing**
  o Core 3A. ME 120 Solid Mechanics
    ▪ (Core 3A is fulfilled by ME 122 Solid Mechanics if taken prior to Spring 2020)
  o Core 3B. ME 110 Materials Processing
    ▪ (Core 3B is fulfilled by ME 125 Materials Processing if taken prior to Spring 2020)

• **Core 4. Design**
  o Core 4A. ME 140 Inventive Design
    ▪ (Core 4A is fulfilled by ME 102 Inventive Design if taken prior to Spring 2020)
  o Core 4B. ME 193 Advanced Product Design
    ▪ (Core 4B is fulfilled by ME 149 Advanced Product Design if taken prior to Spring 2020)

• **Core 5. Human Factors**
  o Core 5A. ENP 162 Human Machine Systems Design
  o Core 5B. ENP 163 Analytical Methods in Human Factors Engineering

2. **Development of Analytical Capabilities (1 course, 3 SHUs):**

- ME 0100 Applied Mathematics for Engineers
  o (ME 150 Applied Mathematics for Engineers fulfills this requirement if taken prior to Spring 2020)
- ME 0101 Numerical Methods ES 101 Numerical Methods
  o (ES 101 Numerical Methods fulfills this requirement if taken prior to Spring 2020)
- ME 102 Statistical Quality Control
  o (ME 108 Statistical Quality Control fulfills this requirement if taken prior to Spring 2020)

Note about graduate electives: All courses will maintain their unique catalog identifier in SIS, which will prevent students from taking the same course twice with two different numbers. By
preventing students from receiving credit for the course twice, we are preventing them from using the same course to fulfill an elective and a core, for example.

**Phase 1 Math Department Impact**

The Department of Mathematics at Tufts offers a partial differential equations I course (MATH-0155) that was deemed too similar to the ME department’s applied mathematics for engineers course (previously ME-0150, newly ME-0100). As such the description of MATH-0151 states “MATH 155 and ME 150 cannot both be taken for credit.” If the new numbers are approved, we will work with the math department to request a change to the MATH-0155 description. (It is anticipated that the reference to ME-0150 will be removed entirely, as the two courses have diverged substantially over time.)

**Phase 1 SoE Undergraduate Programs Impacted**

To the best of our knowledge, there are no undergraduate majors that list any of the courses for which we are requesting changes on their degree sheets.

However, there are two minors (engineering education and music engineering), which will require updates to their minor forms, bulletin text, and websites. Since both of these minors are within the department, we plan to update these when the new numbers go into effect. This numbering change has the potential to impact up to four class years of undergraduate students (first years through seniors at the time of the number change). We will produce two sets of minor forms to aid in this transition:

Set 1: For students who matriculated before the transition (classes of 2020, 2021, 2022, 2023), we will produce a modified minor form that lists requirements. Each requirement will be listed as a new number with a parenthetical reference to the old number, e.g. “If taken before Spring 2020, ME xxx fulfills this requirement.”

Set 2: For students in the class of 2024, we will produce a new minor form with only the new numbers listed for the requirements. As per standard practice, students from class years prior to 2024 may opt to adopt this new minor form.

**Phase 1 SoE Graduate Programs Impacted**

The ME department participates in several interdisciplinary MS and PhD level programs: Bioengineering, Materials Science & Engineering, and Human Robot Interaction. If approved, the new numbers for all requirements relating to these three programs will be distributed to the program directors to update their websites.