The SoE Curriculum Committee is pleased to unanimously recommend the following curricular change:

**1. COMP 117: Internet-scale Distributed Systems**

Request for Action (RFA): Offer new course

Proposed Bulletin description: Principles and practices in designing large-scale distributed software systems on the Internet and beyond, including core principles of the design of the World-Wide Web. Key issues and fundamental principles are explored, e.g. global uniform naming, location independence, Metcalfe's law and network effects, function placement and the End-to-End principle, extensibility and evolution of distributed systems including Postel’s law, leaky abstractions, etc. Comparison with more traditional distributed system designs, e.g. distributed objects, client/server, publish/subscribe, reliable queuing, and remote procedure calls. Prerequisite: Computer Science 40 or permission of the instructor.

Attribute: Engineering

Rationale: As computing becomes more ubiquitous and large-scale projects are undertaken, there are several design principles that inform their design, reliable function, and maintenance. In this course, Professor of the Practice Noah Mendelsohn (co-chair of the W3C governance body for the WWW, along with WWW creator Tim Berners-Lee) teaches the durable principles upon which designs for large-scale systems (including the Internet itself) are based. In this unique and writing intensive class, based upon discussion and readings, students learn how to avoid common pitfalls of large-scale system design and to design next-generation large-scale computing services. This is a unique and transformative experience according to students who have already taken the course as a special topics course. For more information, see also http://www.cs.tufts.edu/comp/150IDS/shouldItakeit

**2. COMP 118: Cloud Computing**

Request for Action (RFA): Offer new course

Proposed Bulletin description: Cloud computing fundamentals, including cloud architecture, scalability, elasticity, and metrics of cloud performance including service-level objectives (SLOs) and service-level agreements (SLAs). Cloud programming models and abstractions including Map/Reduce. Persistent storage mechanisms, including key/value stores and cold storage. Geo-distributed cloud systems. Cloud networking, including data center architecture, software defined networking, and middleboxes. Cloud security. Prerequisites: Computer Science 40

Attribute: Engineering

Rationale: Cloud computing is an emerging paradigm whereby computing services scale with demand. This course introduces the student to the concepts, practices, and principles of using this new paradigm. Students will learn about cloud infrastructure (e.g., data center networks) that "power" cloud computing, the programming model and abstractions (e.g., MapReduce) that enable programmers to leverage the benefits of cloud computing, and other important considerations for
building cloud systems (e.g., security). Strategically, this course meets the need for courses that cover emerging computing paradigms at both the undergraduate and graduate levels. The course exposes our undergraduates to emerging principles of computing that will be important in the future. The course fills a need for advanced systems electives that both augment the graduate program offerings in computing systems and provide options for advanced undergraduate electives and research experiences. The course makes our part-time graduate program more attractive to employers as an employee benefit, and contains principles that can be put into practice immediately on the job.

3. COMP 177: Visualization

Request for Action (RFA): Offer new course

Proposed Bulletin description: Visualization as a tool for data analysis, recall, inference, and decision-making. Tools for visual description and presentation. Principles of effective visualization, including data-visual mapping, interaction techniques, color theory, cognitive and perceptual psychology, and human factors of visual depictions of data. Prerequisite: Computer Science 15 and 61, or permission of instructor.

Attribute: Engineering

Rationale: Visualization is a powerful tool for data analysis and understanding. In this course, students learn to design and build effective visualizations from the ground up.

4. ME 282: Optimal Control and State Estimation

Request for Action (RFA): New course

Proposed Bulletin description:

State-space methods for multi-input, multi-output controller and observer design. LQR control. Bayesian estimation techniques including least-squares estimation, Kalman filters, unscented Kalman filters, and particle filters. Effects of process noise and sensor noise. Emphasis on applications through student projects. Recommendations: ME 180, EE105, or permission of instructor.

Attribute: No attribute

Rationale: A version of the course was offered once as ME280 (Advanced Controls) in Spring 2010. This offering was taught with a heavy emphasis on state estimation, which is not well aligned with the intent of ME280. It is preferable to introduce a new course (ME282) with a strong emphasis on state estimation, so that the existing course (ME280) can maintain a focus on other control topics (e.g. nonlinear, robust, and adaptive control).