Summary of ICE Modules offered in AY 2018-2019:

Integrated Chemical Engineering Topics I (ICE-T I)
Two out of the three ICE-T subjects (10.492/493/494) are required

Note: Students cannot receive credit twice for the same course number

It is strongly recommended that those students planning to register for 10.492A or 10.492B do so on Registration Day for the Fall. Rules for adding 10.492A/B will follow normal MIT policy and must be done prior to Add Date. Rules for dropping 10.492 will also follow normal policy and must be done prior to Drop Date.

10.492B L01 Introduction to Process Control

Course Description: Process Control is essential for the safe, consistent and optimal operation of chemical plants, whose objective is to convert certain raw materials into desired products, using available sources of energy, in an environment of ever changing conditions. This course is an introduction to Process Control and will help you; (a) understand the needs and incentives for controlling chemical processes, (b) define the scope of process control problems, and (c) formulate and solve the problems that lead to the design of the best process controllers.
It contains the following thematic lessons:
Lesson-1: The Control of Processing Systems: Characteristics and Associated Problems
Lesson-2: Brief Overview of Modeling the Dynamic Behavior of Processing Systems
Lesson-3: Foundational Principles of Feedback Control
Lesson-4: Design of Model-Based Control Systems
Lesson-5: Real-Time Implementation of Control and Optimization
The concepts of process control are extendable to many other processing systems of interest to chemical engineers, such as: biomedical devices (kidney dialysis units, insulin injection pumps); drug delivery systems (insulin control in diabetics); microbial population dynamics; metabolic and biological networks in living cells; and others.
Lectures and assignments cover the analytical aspects of model-based control systems (stability, performance, robustness), as well as the methodological trade-offs in designing the best process control systems. Lab sessions will focus on the use of Matlab-based computer-aided tools for the analysis and design of control systems.
In addition to individual assignments, students will undertake a multi-person design project, which will allow them to integrate all aspects of the course.

Units:	2-0-4	
Instructor:	**George Stephanopoulos**	
Sec 1:	MWF 10am – 11am	66-168
Dates:	10/22/18 – 12/12/18	

Summary of ICE Modules offered in AY 2018-2019:

10.492 L02 Biosensors

Course Description: This module will acquaint students with approaches to detection and quantification of biological molecules for diverse purposes ranging from medical diagnostics to environmental monitoring to food safety to defense, and each student will then become a molecular product designer. After gaining familiarity with sensing platforms, devices and instrumentation, biomolecular engineering of probe molecules, quantitative evaluation and comparison of biosensors, and common design trade-offs, students will choose an existing biosensor design to improve. A group design project will give students the opportunity to apply concepts from kinetics, thermodynamics, separations, transport, and/or fluid mechanics to predict the performance of their improved design. The module includes discussion of private sector considerations (markets, intellectual property, FDA requirements and approval process, translational process) as well as ethics.

Units:	2-0-4	
Instructor:	**Hadley Sikes**	
Sec 2:	MWF 10am-11am	66-156
Dates:	10/22/18 – 12/12/18	

10.01 Ethics for Engineers

Course Description: Integrates classical readings that provide an overview of ethics with a survey of case studies that focus on ethical problems arising in the practice of engineering. Readings taken from a variety of sources, such as Aristotle, Machiavelli, Bacon, Hobbes, Locke, the Founding Fathers, and the Bible. Case studies include written analyses and films that address engineering disasters, biotechnology, court cases, ethical codes, and the ultimate scope and aims of engineering.

Units:	2-0-4	
Instructors:	**Bernhardt L. Trout and Staff**	
Fall Schedule:		
Sec 1:	M 3pm-5pm	66-144
Sec 2:	T 3pm-5pm	66-144
Sec 3:	W 3pm-5pm	66-144
Sec 4:	T 7pm-9pm	66-144
Sec 5:	W 7pm-9pm	66-144
Dates:	9/5/2018 – 12/12/2018	
*Students taking this course will get credit for 10.494		
Spring Schedule:		
Sec 1:	M 3pm-5pm	66-148
Sec 2:	T 3pm-5pm	66-148
Sec 3:	W 3pm-5pm	66-148
Sec 4:	T 7pm-9pm	66-148
Sec 5:	W 7pm-9pm	66-148
Dates	2/5/2019-5/16/2019	

Summary of ICE Modules offered in AY 2018-2019:

10.493 L01 (IAP) Electrochemical Energy – Batteries, Fuel Cells

Course Description: Energy technology plays a critical role on an individual and societal scale. Electrochemical energy conversion systems, such as batteries and fuel cells, find applications in personal power--e.g., handheld electronic devices; stationary home power; vehicles; and large scale power plants. Design, sizing, and choice of operation point are important considerations for appropriately engineering these potentially efficient electrochemical systems. Lectures and assignments address the ways that thermodynamics, electrochemical reaction kinetics, and transport factor into power, durability, and efficiency trade-offs. For the project, each group undertakes a detailed analysis of a single or hybrid combination of power sources, leading to design choices targeting a particular device and consumer use.

Units: 2-0-4		
Instructor:	Javit Drake	
Section 2:	MTWRF 11am-1pm, 3pm-5pm	66-144
Dates:	1/7/2018-1/25/2018	

10.494A L01 Title TBD

Course Description: TBD

Units: 2-0-4		
Instructor:	TBD	
Section 2:	MWF 10am-11am	66-168
Dates:	5/6/2019 – 3/22/2019	

Course Description: TBD

Units: 2-0-4		
Instructor:	Daniel G. Anderson	
Section 2:	MWF 10am-11am	66-168
Dates:	4/1/2019 – 5/16/2019	