Boston University
College of Engineering

Course #: **me502**, usually taught each fall, and some summers

Course Title: **Invention: Technology Creation, Protection, and Commercialization**

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(Directions to office: Go in at 15 Saint Mary's, bear right, go down the long narrow corridor, with the glass walls on the left, through the double doors, and my office is on the left, Rm. 133. My office is very close to the ECL computer lab.)

The classes during the Fall semester in 2019, will be on **Tuesdays and Thursdays, 6:30-8:15 pm, Rm 210, Photonics**, at 8 Saint Mary's Street. To get to the classroom, go in at 8 Saint Mary's Street; our classroom, PHO #210, is the first one on the left.

My **office hours** will be 9-10:30 am on Monday and 1-2 pm on Friday, except for holidays of course. See above for directions to my office. If you cannot make those hours, please feel free to contact me by email to arrange another time, or, just stop by and see if I am free.

Please note: This course is often taken by students in all three engineering BU departments, plus the divisions, since inventing new products and technologies is of course important in all areas of engineering.

This course mainly emphasizes, "inventing," arguably the most important aspect of engineering. There are indeed plenty of other important engineering aspects, such as thermodynamics, electrodynamics, dynamical motion, etc. However, inventing a new semiconductor device, a new surgical method, new instrumentation, new products for markets that never existed before (*e.g.*, radio, laser, phonograph, light bulb, airplane, etc.), all clearly contribute to major changes in our world. Engineers are absolutely key to making such changes happen. It's a nice situation for us!

We will also go over many other things, including the laws that protect such ideas, and we will get into the early stages on how to commercialize such activity. Both the laws and the commercialization sections of this course are certainly important. Nevertheless, the single overriding emphasis in this course will be on inventing.

Course Description/Catalog Data:

This course provides students with the knowledge and tools necessary to create, protect, and commercialize engineering and scientific intellectual assets. Students will first make use of creativity tools to attack posed engineering problems, then turn to means for protecting their solutions. Rapid growing areas that are affecting nearly all businesses (e.g., software and the internet) will be covered. Extensive patent searches and analysis will be carried out to develop skills for quickly ascertaining the protected technical content of patents, and for recognizing what

intellectual property (IP) should be and can be protected. Legal aspects for protecting creative ideas will be studied at a level appropriate for engineers to interact easily and smoothly during their technical careers with IP lawyers. Finally, various business models for the commercialization of intellectual assets will be analyzed. Extensive class exercises and projects will explore in depth in all three of these important areas of IP, with emphasis on key contributions during engineering and scientific research and development activities.

Prerequisites: Senior or graduate standing, unless separate approval by D. Cole.

Textbooks and articles:

(1) I will target sections from several books, including the following (you will not need to buy these books):

(*i*) "The Art of Innovation: Lessons in Creativity from IDEO, America's Leading Design Firm," by Tom Kelley, Jonathan Littman, Tom Peters, and Tom Peters, published by Doubleday Business, 2001, ISBN 978-0385499842.

(*ii*) "On Intelligence," by Jeffrey Hawkins.

(*iii*) "On Writing," by Stephen King.

(2) Three business case studies from the Harvard Business School. You will need to purchase these over the internet. Once classes begin, I will tell you how to go about doing so. You will not need these case studies immediately, and I will give you a heads-up as to when. However, you will find that you can download them promptly, when needed, in *.pdf format, at: http://harvardbusinessonline.hbsp.harvard.edu.

(i) Case CMR074, "Managing Intellectual Capital: Licensing and Cross-Licensing in Semiconductors and Electronics," by Peter C. Grindley, and David J. Teece, 1997, 35 pp.

(ii) Case 376266, "Polaroid-Kodak," by Norman A. Berg and Glenn W. Merry, 1984, 18 pp.

(iii) Case 388041, "CVD, Inc. vs. A.S. Markham Corp. (A), by Michael J. Roberts and Ennis J. Walton, 1998, 26 pp.

That is it in terms of purchases, except for a notebook I will be asking you buy to write your "improvement" and "invention" ideas in. You can choose from a variety, but ones that I like and that seem to work well for students are the Moleskin variety. Here are a few examples:

Moleskin, 240 pages, hardcover, 5.3 x 0.7 x 8.4 inches, such as at (many other places to purchase, such as at Blick Art Materials at 401 Park Drive near BU) (this is my favorite for my own use)

http://www.amazon.com/Moleskine-Plain-Notebook-Large/dp/8883701143/ref=sr_1_2?s=books&ie=UTF8&qid=1345844769&sr=1-2&keywords=moleskine+notebook

or the same size, but more of a leather-like soft cover, kind of nice,

http://www.amazon.com/Moleskine-Classic-Notebook-Large-Notebooks/dp/8883707206/ref=sr_1_1?s=books&ie=UTF8&qid=1463017237&sr=1-1&keywords=moleskin+classic+cover+large+notebook+soft+cover

or, again a soft cover, but little larger notebook, 192 pages, 7.5 x 0.5 x 9.8 inches

http://www.amazon.com/Moleskine-Plain-Notebook-Cover-XLarge/dp/8883707265/ref=sr_1_2?s=books&ie=UTF8&qid=1345845614&sr=1-2&keywords=moleskine+soft+cover+large

There are plenty of other fine styles as well. I usually like the plain ones (not lined), but some folks like them ruled (i.e., lined). You will find that you will be filling up one of these notebooks quite a bit. If you are unsure of what to get, it's fine to wait after the first day of class to discuss before going out and buying a notebook.

In case you are curious, here are some case studies I have used in the past, but will not be this year. Some I will likely mention, but you do not need to purchase or read them.

* Case 808118-PDF-ENG, "The Travails of Rubber: Goodyear or Badyear?", by Tom Nicholas, 2008, 17pp.
* Case R0611C-PDF-ENG, "Innovation: The Classic Traps," by Rosabeth Moss Kanter, 2006, 14 pp.
* Case SMR265-PDF-ENG, "Breakthroughs and the 'Long Tail' of Innovation," by Lee Fleming, 2007, 8pp.
* Case KEL104, "Technical Note: Innovation and Invention—A patent guide for inventors and managers," by James G. Conley, David Orozco, 2007, 37 pp.
* "In the Air: Who says big ideas are rare?", by Malcolm Gladwell, from the New Yorker, 2008, 12pp.
* Case 9-806-105, "Google, Inc.," by Kerry Herman & Thomas Eisenmann, 2006, 33 pp.
* Case 608080, "AT&T v. Microsoft (A): IP Litigation Strategy,"by Willy Shih, 2008, 20 pp.
* Case 807124, "Technology Transfer at U.S. Universities," by Richard G. Hamermesh, Josh Lerner, David Kiron, 2007, 29 pp.
* Case 12089-PDF-ENG, "Secrets of Successful Innovation (HBR Article Collection)," by Kevin P. Coyne, Patricia Gorman Clifford, Renee Dye, Teresa M. Amabile, Dorothy Leonard, Susaan Straus, Ed Catmull, 2008, 51pp.

For your curiosity, a textbook that we used to use up until 2006, that you might find interesting (the stories were getting a bit old, but there is still much of value here) is: "Rembrandts in the Attic: Unlocking the Hidden Value of Patents," by Kevin G. Rivette and David Kline, published by Harvard Business School Press, 1999, ISBN 0875848990.

Also, in the past I have used the following books:
* "Intellectual Property: Patents, Trademarks, and Copyright (Nutshell Series)," by Arthur R. Miller, Michael H. Davis, and Micheal H. Davis, published by Thomson/West, 2007, ISBN: 978-0-314-15875-8.
* "The Ten Faces of Innovation: IDEO's Strategies for Defeating the Devil's Advocate and Driving Creativity Throughout Your Organization," by Thomas Kelley and Jonathan Littman.

Many, many other books exist on how to invent, how to write a patent, how to be more creative, etc. I will mention about 25 others as we go through the course and provide a list of these for your own interest.

Goals: Many technology companies are finding that newly hired engineers and scientists lack the ability to recognize and capitalize on their contributions during regular development and research activities. Patent creation is becoming an increasingly important commodity, particularly for companies involved in rapidly expanding technology areas. The goal of this course is to train students to be more valuable as employees when they work in industry, and/or if they become entrepreneurs.

This course covers legal aspects of intellectual property, including all aspects of a patent write-up (e.g., abstract, body, and claims), trademarks, and trade secrets. Key historical patents will be studied, as well as current ones of particular interest, including patents involving the internet, software, biotechnology, microelectronics, and communications. Students will gain valuable experience by performing patent and infringement searches. They will become adept at reading and analyzing the relevant parts of patents, and at interacting easily with IP lawyers to ensure that key engineering and scientific developments are protected. Finally, this course will cover how intellectual property can be made extremely useful, economically, to a company, by properly leveraging these ideas.

We will most likely have some guest speakers during the semester, including a high level lawyer, plus likely a prolific inventor.

Below are the grading topics and due dates for the four main items in this course. Regarding the percentages, they reflect the weight of that item in the final course grade.

	Grading:	**Date:**
Midterm	25%	10/17/19
Idea log / notebook	20%	11/7/19
Class project / presentation, patent, business case, prototype	30%	Dec. 5 & 10
Final	25%	TBD

The midterm exam will be held on Thursday 10/17/19 (class #13). Notebooks will be due on Tuesday, 11/7/19 (class #19). Project presentations will be on Th, 12/5/19 (class #26), and Tuesday 12/10/19 (class #27).

The final exam will be held during the university's final exam period between 12/16/19 and 12/20/19. Usually we learn the date, time, and place for our course's final exam during the first month of class; I will announce the time and place as soon as I learn them from the registrar.

The idea log will be explained in class, but roughly consists of 35 improvement ideas, with four of the best developed in some detail and searched on the patent database.

All information about the course, lecture presentations, etc., will be posted on blackboard course info at learn.bu.edu . Our class blackboard site should be up and running by the first class.

Emails will regularly be sent to you via your bu email account, so either please check your "bu" email regularly, or have it automatically forwarded to your work or other main email account.

If you miss class, you are responsible for getting notes from someone else as to what happened in class. In nearly all cases, except in the case of a power outage or equipment failure (rarely happens) the classes are recorded and are available about ½ hour or so after class ends. The url for accessing these videos will be sent to you soon. Indeed, some of you may wish to take advantage of the distance learning capabilities of this course. I.e., if you know events are coming up during classes, where you will be traveling, either for business, or weddings etc., then you might want to register under the DL section (distance learning) of this course. You can still attend in person when able, but otherwise can stay in touch far more easily when traveling. I will tell you more about this possibility during the first day of class.

Topics		**Rough % of course emphasis**
1.	**Creative process of patent generation** This work will involve attacking posed engineering problems and coming up with creative technical means for solving these problems. Technical work will be documented with the intent of putting the content into mock patent write-ups for protecting generated intellectual property. Posed problems will involve a variety of some of the key growing industries that encroach into nearly all areas of business, including the internet, software, computers, semiconductors, and communication.	20
2.	**Legal aspects of patent protection, trade secrets, etc.** The level here is not that for patent lawyers, but is at the level that is felt to be essential for engineers and scientists to best bridge the technical/legal gap that typically exists between engineers and IP lawyers.	30
3.	**Commercialization of intellectual property.** This work will cover a number of relatively recent case study examples in several of the faster growing and rapidly changing industries, including the areas of software, the internet, microelectronics, communications, and bioengineering. Various business models for the exploitation of intellectual assets will be analyzed. Class exercises will include constructing a business model that maximizes the return on a given intellectual asset.	20
4.	**Exercises plus development of final project** This work includes exercises on patent writeup, brainstorming, patent database searching, and commercialization plan development. The last half of the class, mixed in with the material on commercialization of intellectual property, will be time spent on in-depth mock write-ups of patents & analyzing past & present key patents. Extensive patent searches will be carried out, making considerable use of available information on the internet. Students will gain the ability to quickly assess the heart of a patent, what is protected, what is not, and how this information can be best leveraged in their technical work. The aim here will be to enable students to move beyond the "legal" language barrier to be able to use patent information quickly and easily, and to be able to readily and effectively recognize and document the important aspects of their technical work. The final week will consist of presentation of a potentially patentable and marketable idea, supported by a mock patent writeup, plus a business case to the other students of the feasibility of using this patent for business purposes. The class will serve as a group of "pretend" potential investors, who will input their evaluation of the presentations to the instructor, who will then make the final grade assignments for these projects.	30