TIM 105 Introduction to Management of Technology I: Management, Development and Commercialization (MDC) of Technology and Products

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**Time**: Tuesday and Thursday, 11:40AM-1:15 PM

**Course Location**: Classroom Unit 1

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About the course:

MOT I is the first in a sequence of courses on the management of technology. Briefly, MOT I focuses on **new product/technology design and development**, while the second course MOT II deals with the end-to-end design of the supply chain network necessary to distribute the product from the supplier through the manufacturer to the customer.

MOT I will provide students with a systematic methodology and the corresponding set of methods and analytical tools to address the **management, development and commercialization** (MDC) of technology and products in an integrated manner, which enables the cost-effective and rapid development of profitable and high quality technologies and products. Topics covered will include engineering/product design and development, strategic analysis of the business landscape, integrated cross-functional development strategy, and finance. These topics will be addressed within the context of high technologies such as software, computers, information systems, semiconductors, storage, nanotechnology, and biotechnology.

Objectives of the course:

* To understand the functional areas (e.g, technology, business, marketing) and phases involved in the end-to-end design, development, and delivery of technology and products. This starts with competitive strategy and customer needs, flows through conceptual design, prototyping, and manufacturing, and continues to product release and marketing.
* To develop and apply an integrated framework for the **management, development, and commercialization** (MDC) of technology.
* To develop and apply methods and tools that make technology management, development and commercialization more effective. These tools will be both qualitative and quantitative in nature.
* To gain experience with the MDC of high tech through comprehensive case studies and the term project.

Grading:

* Homework: 25%
* Project: 25%
* Midterm Exam (Take-Home; 10/27/16): 25%
* Final Exam (Take-Home; 12/1/16): 25%

Project Plan (due dates are in parentheses):

* Form project teams and choose technology/product domain (9/29/16)
* Project Proposal; preliminary “market needs” assessment; preliminary competitive and market strategy (10/4/16)
* Phase 1: Strategy (technology strategy; competitive /business strategy ; market strategy) and Product Portfolio (10/18/16)
* Phase 2: Product Design and Development; Product Platform (11/1/16)
* Phase 3: Commercialization: Product Architecture and Product Line Strategy; Financial Analysis; Quality; Robustness (11/15/16)
* Phase 4: Integration, Final Report, and Project Presentation (11/22/16)

In general, you will be applying what you learn from the lectures and homework to your team project. To help you in this process, each homework assignment will clearly outline the requirements (“deliverables”) for each phase of the project that coincide with that assignment.

General Comments:

* No single textbook covers the diverse set of topics and tools that constitute this course (see table on Page 3). **It is critical that you attend the lectures and take good notes, as you will be responsible for understanding things covered in lecture that are not included in your textbooks.**  A list of reference texts is provided below. The course topics table on Page 3 provides a text reference for each topic.
* The course will cover both qualitative and quantitative methods and tools that are useful in the development and commercialization of technology.
* **This course is very interactive.** We will be actively discussing case studies and homework in class**.** Therefore, **attendance is mandatory**. Please contact me ahead of time if you have to miss a lecture for some important reason.
* **Keep a project notebook**, which will be used when grading your term project.
* If you have any problems related to the course, please see me immediately so that we can quickly resolve the issue.

**Required Text Book for the course:**

PDD: Ulrich, K. T., and Eppinger, S.D., Product Design and Development, Any Edition

(The PDD textbook is also available at the UCSC Baytree Bookstore in the form of a print version or e-book)

**Course Reading List:**

(The acronyms preceding each reference are used in the last column of the table of course topics on Page 3.)

MNPPD: Clark, K. B., and Wheelwright, S. C., Managing New Product and Process Development, Text and Cases, The Free Press, 1993.

Golub, A. L., Decision Analysis, An Integrated Approach, John Wiley & Sons, 1997

PSHTC: McGrath, M. E., Product Strategy for High Technology Companies, McGraw-Hill, 2001.

SBL: Ghemawhat, P., Strategy and the Business Landscape, Text and Cases, Addison Wesley, 1999.

QERD: Phadke, M. S., Quality Engineering using Robust Design, Prentice-Hall 1989.

QTD: Fox, J., Quality through Design, McGraw-Hill, 1993.

SMTI: Burgelman R. E., et. al., Strategic Management of Technology and Innovation, third edition, McGraw-Hill, 2001.

Course Topics (M denotes management, D denotes Development, C denotes commercialization; topics might vary slightly depending on specialization of the students)

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| **Topic** | **Methodology/Tools** | **Case Study (Company or Tech. Domain)** | **Reference**  |
| Introduction: The Structure of the MOT I course  | Structured Problem-Solving | Xerox | PDD, Chapters1-3 |
| MDC Framework | Integrated MDC Framework |  | Lec. Notes |
| M1: Technology, Market and Competitive Strategy | Functional Maps | The Disc-Drive Industry | MNPPD |
| M2: Market/Competitive Analysis of Industry  | Porter’s Five Forces Framework  | Intel, Microsoft  | SBL |
| M3: Establishing Customer Needs and Technical Specifications  | Quality Function Deployment (QFD) | Specialized Bicycle Components | PDD, Chap. 4,5 |
| M4: Aggregate Project Planning | Probabilistic Decision Analysis  | Enterprise Software | \_\_\_\_\_\_\_\_\_ |
| D1: Development Project Planning  | Design Structure Matrix, GANT and PERT charts  | Kodak | PDD, Chap. 16 |
| D2: Conceptual Design of the Product | Function Analysis System Technique (FAST), Function Structure, Utility Functions | Robot design; Stanley-Bostitch | PDD, Chap. 6,7,8 |
| D3: Product Planning: Product Platforms and Architectures | Product Platform Strategy and Product Line Strategy | Intel, Apple | PSHTC  |
| D4: Product Prototyping, Detailed Design, Design Review | Concurrent Engineering (CE), Virtual Integrated Prototyping (VIP) | iRobot, Boeing | PDD,Chap.11-12 |
| C2: Manufacturing | Design for Manufacturing (DFM), Failure Modes and Effects Analysis (FMEA) | Boeing | QTD |
| C3: Economics of Product Development | Net Present Value (NPV) Analysis | Polaroid | PDD, Chap. 15 |
| C4: Robust Design (TIM 205 only) | Design of Experiments (DOE) | Semiconductor Processing | PDD,Chap. 16 |