TECH-919 Innovation Process Management

Living Syllabus, Fall 2004, version 1.2, 7/14/04
section 61, TF 0830-1000, Jacobs Center Room TBD, First meeting 9/24
section 71, T 1800 to 2100, Wieboldt Hall Room TBD, First Meeting 9/28

Overview for Fall 2004: In this course we examine the innovation processes used by leading firms to realize successful commercialization of product and service offerings. Constructs, methods, tools, technologies and metrics for managing innovation and new product development are investigated in the context of entertainment (Sony, Nintendo), pharmaceuticals (Searle), software (Microsoft), automotive (BMW, Toyota), yacht racing (America’s Cup), telecommunications (Motorola/Nokia), lawn and garden (Ryobi, Midwest Air Products) server hardware (HP), novel order fulfillment systems (Dell) and others. Most cases developed at Kellogg for this course. Additionally, we will compare the NPD and new business concept (NBC) approaches to commercial innovation and observe that related successes (and failures) are the result of a process that can be controlled, measured and actively managed. This year’s offering will include short visits to Innovation Centers at Johnson Controls (automotive interiors), Hermann Miller (Interior Office space) and IDEO (Industrial Design firm) to supplement in the in class experience (great last year).

Courseinfo Web pages: registered students only.

SECTION 61: http://courses.northwestern.edu/webapps/portal/frameset.jsp?tab=courses&amp;url=/bin/common/course.pl?course_id=20146

SECTION 71: http://courses.northwestern.edu/webapps/portal/frameset.jsp?tab=courses&amp;url=/bin/common/course.pl?course_id=27419

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Office hours:
• Jacobs Center room 5249: Tuesdays 11:00 to 2:00 p.m., or by appointment.
• Wieboldt Hall M269 Tuesdays 5:00 to 6:00 p.m. or by appointment

Syllabus Contents:
1. Course Description and Objectives
2. Cases and Course Materials
3. Session Schedule
4. Readings/Assignments/Deliverables
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6. Study Groups
7. Class Participation Classroom Etiquette
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9. Final Projects
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11. Kellogg Honor Code
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Course Description and Objectives

New products and services are the lifeblood of healthy firms. They continually differentiate from the competition, helping to sustain competitive advantage. This course explores both traditional and emerging approaches to Innovation Process Management with an emphasis on the operations, information technology and management strategies influencing project success and profitability. In examining the best practices, students learn how to analyze an innovation process using methods designed to help managers make more informed decisions about the respective investments.

In addition to studying planning methods for innovation, design philosophies/systems and the shorthand/language of product innovation known as prototyping, student groups will supplement the learning in the classroom (lecture, case study, guest speaker based) with classroom discussion (we will learn from each other), Field Trips to Lead Innovator firms (IDEO, Johnson Controls, Hermann Miller) in three different industries, and final projects (presentations/papers) examining innovation process management at selected firms.

The overall objectives of TECH-919 include:
1. Examine contextual issues pertinent to understanding innovation processes in practice;
2. Review significance of innovation and critical contributions to economic value creation.
3. Provide a foundation in the basic methods, practices, technologies and metrics/strategies of innovation process (i.e. new product development NPD);
4. Explore the factors transforming innovation processes/practices such as design for x methods, rapid prototyping, product architecture and modularization, mass customization, commonality, process metrics, distributed innovation environments, design for postponement, product/service convergence and digitization, customer integration in a network enabled environment, etc.
5. Analyze (through case study) both successful and failed innovation management methods and programs.
6. Understand how effectively managed innovation processes create and sustain competitive advantage in both emerging and mature industries.

TECH919 counts toward the Technology Industry Management and Operations Management majors.

1. Course Materials

The majority of course case reading materials can be found in the case pack that is available in the bookstore. The course materials come from the academic research press, trade and professional publications and from the instructors research/case materials. All slides and or Powerpoint materials used in this course are made available to the students via the courseinfo web site.

Cases covered in this course were selected to address operations issues in innovation management for a breadth of industries/issues including the following. Many were developed by Kellogg students and faculty directly for this course:

- **Ryobi Outdoor Product Case:** Platform innovations in a mature business (lawn and garden) KSM
- **HP Blade Server Case:** Innovation process methods: Do’s and Do nots KSM
- **NPD Metrics at Harley:** Innovation process measurements and incentives/firefighting KSM
- **Team New Zealand Cases:** Time Critical development challenge of Americas cup racing
- **BMW Seven Series Cases:** Alignment of prototyping strategy and corporate strategy
- **Maxis Software Case Series:** Challenges with managing Game Software innovations, KSM
- **Midwest Air Technologies:** The Fast Follower, a lean NPD organization with agility KSM
- **Diesel Fashion Innovations:** Best practices for web based customer integration and NPD KSM
- **NPD at Dell Computer Corp:** Design flexibility and development with unproven technologies
There are no required textbooks for this course. However the following books provide considerable, deeper insight into the materials prepared and presented in lecture. They also provide some best practices examples that is useful beyond the classroom. The first two listed books are available in the Evanston bookstore. Please let me know if the bookstore runs out of any of these resources.

Recommended/Worthwhile reads from Prof. Conley's bookshelf.

- **Masterworks of Technology** a brand new book due out in Fall 2004 by my colleague Elmer E. Lewis. This book examines significant, pioneering, historical inventions and innovations and how they came to pass. Additionally, the book explores the interfaces between science, engineering, and successful commercial management. Great read. If this gets to market on time, I will order for the bookstore.

- **Setting the PACE in Product Development** by Michael E. McGrath, Published by Butterworth-Heinemann, 1996. A nice overview of product innovation processes from a traditional point of view. Frameworks and planning tools/procedures are discussed at length. This book is available in the Evanston Norris Center bookstore (847-491-5812) for about $20. Please let me know if the bookstore runs out.

- **The Art of Innovation**, by Tom Kelley, Interesting read that describes how the most successful product design firm in history (IDEO) plan, executes and otherwise manages its internal innovation processes. Fascinating insight on how to manage VERY creative people. This book is available in the Evanston (847-491-5812) bookstore for about $26.

- **Invention by Design** by Henry Petroski, Published by Harvard University Press, 1996. This is an excellent book examining how innovation occurs and is captured in new products. Commercial innovation of both simple (paper clips) and complex (airplanes, FAX and networks, skyscrapers... pre 9/11/01 World Trade Center design discussion is very interesting) products is described. Available online paperback for about $20.

- **Clockspeed**, by Charles Fine, This work analyzes cycles of products, process, and organizational innovations in fast moving industries. Using biomimicry, the author makes an analogy between the principles of genetics and supply chain choices driving company and industry evolution. Author stipulates that we are now entering an age of "temporary competitive advantage". Available online for about $16.


- **Design Rules**, by Baldwin and Clark, 2001. An interesting, in depth review of the multiple ways that Modular Design influences the growth and expansion of an industry. Using the example of the computer industry, these authors carefully demonstrate how modular design has sparked rapid growth and enhanced diffusion of innovations. On line for about $50.
3. **Tentative Session Schedule:** Section 61 meets TF starting 9/24. Section 71 meets T starting 9/28

Please note: This schedule is subject to minor changes, due to guest speaker arrangements. Dates as given below pertain to section 61. Section 71 will begin on 10/1 and each session will cover two class periods of content.

<table>
<thead>
<tr>
<th>Course Week #</th>
<th>Session Sec. 61 Date</th>
<th>Content First Five weeks</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>9/24F</td>
<td>Introductions, Explanation of Syllabus, Student Expectations Genesis of this course</td>
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<tr>
<td>1</td>
<td>9/28T</td>
<td>Innovation in context of new offering development, The Taxonomy, The role of perspicacity and new combinations ala Schumpeter Preliminary discussion of Ryobi Outdoor Products Case (KSM Case)</td>
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<tr>
<td>2</td>
<td>10/1F</td>
<td>Processes for Innovation Management/Product Development Core Teams, Structured Methodologies, Phase Gates, Development Tools, The PACE Process</td>
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<tr>
<td>2</td>
<td>10/5T</td>
<td>Conventional NPD process metrics and analysis Enhanced performance visibility in a networked development chain Case Discussion: HP Blade Servers Case (KSM Case)</td>
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<tr>
<td>3</td>
<td>10/8F</td>
<td>Design for X: Quality, Manufacturability, Modularity, Service, Assembly, Environment, Service, Postponement etc</td>
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<tr>
<td>3</td>
<td>10/12T</td>
<td>Design for Postponement and customer focused order fulfillment Case CPS color and the color pigment industry, paints, dies etc.</td>
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<tr>
<td>4</td>
<td>10/15F</td>
<td>Design and the Art of Innovation IDEO Product Development System SPEAKER Craig Sampson from IDEO</td>
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<tr>
<td>4</td>
<td>10/19T</td>
<td>Analysis of Product Piece Part Commonality, commonality indices and implication for the Cellular Handset Industry</td>
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<tr>
<td>5</td>
<td>10/26T</td>
<td>Prototyping and Product Strategy Rapid Prototyping for downstream manufacturing processes</td>
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<td>Course Week #</td>
<td>Session Sec. 61 Date</td>
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<td>6</td>
<td>10/29 F</td>
<td>Case of the Boeing 757 Door</td>
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<td>Case Discussion: Team New Zealand Series</td>
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<td>6</td>
<td>11/2T</td>
<td>Platforms</td>
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<td>The Role of Platforms in Innovation Processes</td>
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<td>Guest Speaker, Ashutosh Saxena</td>
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<td>11/3</td>
<td>FIELD TRIP TO Herman Miller/Johnson Controls Depart KSM 0530</td>
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<td>7</td>
<td>11/5F</td>
<td>Midterm/Case Discussion: BMW Seven Series Cases</td>
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<td>Mass Customization implications for</td>
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<td>Revenues, Cost, Product Architecture</td>
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<tr>
<td>7</td>
<td>11/9T</td>
<td>Software Innovations and Platforms</td>
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<td>Maxis Software Case Discussion</td>
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<td>8</td>
<td>11/12F</td>
<td>Network Methods for Enhancing NPD Efficiency “Customer Integration in</td>
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<td>NPD” Short Life Cycle: Italian Fashion Industry DIESEL (KSM Case)</td>
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<td>Long Life Cycle Products in Contrast (HD)</td>
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<td>8</td>
<td>11/16T</td>
<td>Guest Speaker, Dr. Norman Levy, Former CEO of Fujisawa Pharmaceuticals:</td>
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<td>Innovation process management in the prescription drug business</td>
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<td>9</td>
<td>11/19F</td>
<td>The Innovation Radar</td>
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<td>Guest Speaker Rob Wolcott, KSM Fellow</td>
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<td>The innovation leader and the fast follower: Contrasting approaches</td>
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<td>Case Discussion: Midwest Air Technologies</td>
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<td>9</td>
<td>11/23T</td>
<td>In-Class Presentations on Student Projects I</td>
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<td>THANKSGIVING VACATION</td>
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<tr>
<td>10</td>
<td>11/30T</td>
<td>In-Class Presentations on Student Projects II</td>
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<tr>
<td>10</td>
<td>12/3F</td>
<td>Course Summary and Wrap-up Discussion</td>
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<td>What did we learn?: What did you like or not like about this course?</td>
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<td>Peer Group Performance Evaluations/Course Evaluations</td>
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4. Readings/Assignments/Deliverables:

Below is a week by week schedule for Reading/Assignments and Deliverables. Please review this part of the Syllabus regularly (see courseinfo web site) to make sure that the schedule has not been altered.

Case write-ups (limited to two pages plus 2 exhibits) will be due in the electronic drop box of the courseinfo web page AT LEAST 6 hours before the class session in which they are discussed. Electronic deposits in the drop box are time stamped. Late submissions will not be accepted.

**Week 1:**
Readings:
- *Innovating for Cash:* HBR Article, September 2003, Case Pack
- *Ryobi Outdoor Products:* Kellogg MMM Case Study, Case Pack or courseinfo site
- *The New Product Development Imperative* Teaching Supplement, Case Pack
- *The Art of Innovation,* (Recommended, Bookstore)
- *The Henkel Sustainability Report 2002,* (Recommended, Courseinfo site)

Deliverables:
- **Study group formation, send e-mail message to j-conleya@kellogg.nwu.edu by end of week #2**
- **Ryobi Outdoor Products:** Individual write-up on case questions due in digital dropbox 6 hours before beginning of class on 9/28 for section 61, and 10/7 for section 71.

**Week 2:**
Readings:
- *HP Powerbar Case:* KSM Teaching Case (Case Pack and Courseinfo site)
- *Specifications-Do we Understand...Horizons Article* (Case Pack)
- *Setting the PACE in Product Development,* (bookstore, recommended)
- *Performance Measurement in Industrial R&D,* by I. Kerssens- van Dongelen et al in International Journal of Management Reviews, V2, no. 2, pp111-143, 2000 (Recommended, courseinfo site)

Deliverables:
- **HP Powerbar Case:** Group Write-up on case questions (assignment questions on courseinfo site,) due in digital dropbox 6 hours before beginning of class on 10/5.

**Week 3:**
Readings:
- *Product Development at Dell Computer Corporation* Case Study (Case Pack)
- *Robust Engineering Design Post Taguchi* Proc. of the Royal Society (Case Pack, course info site)
- *Managing in an Age of Modularity* HBR Article (Case Pack)
- *Creating Project Plans to Focus Product Development* Article (Case Pack)

Deliverables:
- **None**
Week 4:
Readings:
- New Product Development at Harley Davidson Motor Company: KSM Teaching Case (Case Pack, Courseinfo site)
- Experience Prototyping, White Paper by Jane Fulton-Surrey (case pack, courseinfo site)
- Understanding Fire Fighting in NPD, JPIM 2000, (case pack, courseinfo site)
- It’s Not Just RP Anymore  Article from SME Magazine found at URL http://www.sme.org/cgi-bin/get-mag.pl?GROUP&MEMBNUM&2000/00my0098&000007&2000/00my0098&&SME&

Deliverables:
- New Product Development at Harley Davidson Motor Company: Group Write-up on case questions, (assignment on courseinfo site.) due in courseinfo drop box by 0300 hours on 10/17

Week 5:
Readings:
- Team New Zealand A Case. Case Study (Case Pack)
- Rapid Silicon Prototyping for Systems on a Chip Phillips Electronics white paper (Courseinfo site)
- Tools to die for (Article from SME Magazine) found at URL http://www.memagazine.org/backissues/june00/features/tools/tools.html
- A New Frontier in Engineering  Article from Mechanical Engineer Magazine at URL http://www.memagazine.org/backissues/february98/features/newfront/newfront.html

Deliverables:
- Team New Zealand A: Group write-up on case questions due in digital dropbox 6 hours before beginning of class on 10/31.

Week 6: MIDTERM WEEK
Readings:
- The BMW Seven Series Project A. (Case Pack)
- Managing Platform Architectures Journal of Product Innovation Management (Recommended, courseinfo site)

Deliverables:
- The BMW Seven Series Project A (individual assignment questions = midterm, on courseinfo site.) due in courseinfo drop box by 0300 hours (3:00 a.m.) on 11/7
Week 7:
Readings:
- *Maxis Software Case* (Case Pack, courseinfo site)
- *Developing Products on Internet Time* HBR Article (Case Pack)

Deliverables:
- *Maxis Software case* Write-up (assignment on courseinfo site). Group write-up due in courseinfo drop box by 0300 hours on 11/11

Week 8:
Readings:
- *Virtual Communities: Technology & Consumer Insight for Product Development at Diesel SpA* Kellogg White Paper (Case Pack, Courseinfo site)
- *Communities of Creation*: CMR Article (courseinfo site)

Deliverables: None

Week 9:
Readings:
- *Midwest Air Technologies: The Fast Follower* KSM Case (Case Pack, Courseinfo site)

Deliverables:
- *Midwest Air Technologies: The Fast Follower* Group Write-up on case questions, (assignment on courseinfo site.) due in courseinfo drop box by 0300 hours on 11/21
- In class presentations on projects (be prepared to present on 11/25) due courseinfo drop box by 0300 hours on 11/25

Week 10:
Readings:
- Re-Read Ryobi Outdoor Products: (MMM Kellogg/McCormick Case, Case Pack)
- *New Offering Realization* Book Publication (Case Pack)

Deliverables:
- Final Project: Due in courseinfo drop box by 1700 (5:00 p.m.) hours on 12/6/01
5. Grading

<table>
<thead>
<tr>
<th>Grade Component</th>
<th>Individual / Group</th>
<th>Weight</th>
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</thead>
<tbody>
<tr>
<td>Class Participation</td>
<td>Individual</td>
<td>20 %</td>
</tr>
<tr>
<td>Case Write-ups/Assignments</td>
<td>Study Group/Individual</td>
<td>20 %</td>
</tr>
<tr>
<td>Midterm Case Write-up</td>
<td>Individual</td>
<td>20 %</td>
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<tr>
<td>White Paper/Project: Presentation &amp; Paper</td>
<td>Study Group</td>
<td>40 %</td>
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Details on the grade components follow below. Peer evaluation forms posted to the web will be used to assess individual contributions to group projects. It is required that all individual students fill out a peer evaluation form. More details on this during class #1.

6. Study Groups

You are required to form study groups of 2-3 students and notify me of your grouping by session 2 or as soon as possible thereafter by e-mail. Teams should discuss and work on cases (both those with individual and group deliverables) and undertake the final projects. We request that you stay in the same study group all quarter.

7. Classroom Etiquette and Class Participation

All students are expected to fully comply with the Kellogg Code of Classroom Etiquette (http://www.kellogg.nwu.edu/stu_aff/honor/etiquette.htm)

Please leave your name card up for the entire duration of each class and keep the same seat for the duration of the quarter.

You are expected to attend all classes. Attendance is mandatory in the first class session, for the midterm case discussion, for guest speakers and for the in-class final project presentations. If you have to miss class for any reason, you must notify me by e-mail before the scheduled start of the session so that we can schedule alternative arrangements.

Much of the learning in this course comes from class discussion. Your classroom participation grade will be based on attendance, preparation, familiarity with the reading materials, and the quality of your contribution. Some of the key characteristics of valuable contributions are as follows:

- Relevance: Are your comments timely and linked to the comments of others?
- Advancement: Do your comments take the discussion farther or deeper than previous comments?
- Fact-based: Have you used specific data from the case, from readings, or from personal experience to support the assertions that you are making?
- Logic: Is your reasoning consistent and logical? Do you use concepts from the readings or lectures correctly?
- Originality: Do your comments merely restate the facts or do they provide new insights?

Generally, an important criterion is your contribution to the creation of a positive learning environment. For example, correcting me when I make a mistake or asking what appear to be “dumb questions” about what is being covered both do help. In the case of “dumb questions”, very often half the students will have the same question in mind and are relieved that someone has posed it.
To increase opportunities for effective participation, I will occasionally cold call students either to open the class or during the course of a discussion. If you feel that you are preparing well but that I am not calling on you often enough, please let me know so that I can adjust.

8. Midterm Examination

The midterm for this course will be a straightforward exam/Case analysis covering materials discussed in class and addressed in the assigned readings.

9. Final Project:

This assignment is to be carried out with the members of your study group.

Objectives:

The final project offers an opportunity for student groups to exercise and or integrate the learnings of the course into an in-depth analysis of state-of-the-art innovation management processes within a specific firm or industry (healthcare, pharmaceuticals, power generation, automotive, retail, consumer durables, etc.) or technology application domain (electro-optics, etc.). The manuscript can take the form of either a white paper or a case study. Examples of past deliverables are available on the courseinfo web site and will be discussed in depth during the first day of class.

Deadlines & Deliverables:

- Deliverables include a 20 minute powerpoint presentation to be delivered to the class on during the week of 11/25. Powerpoint files must be delivered to the courseinfo website by 0300 hours on 11/25.
- Final project manuscript deliverables are both due in hard copy as well as in digital form in the digital dropbox on the courseinfo page on 12/6/01 by 5:00 p.m. If I am not available, manuscripts may be left with Rahi Gurung in the room just across from my Evanston office (5249 Jacobs Center) during regular business hours.

Grading of Final Projects:

Your grade will be determined based on the quality of your written report and presentation.

A high quality written deliverable is characterized as follows:

- Sound structure, based on a relevant conceptual framework.
- Comprehensive coverage of the relevant issues.
- Consistency and depth of analysis; specific rather than vague.
- Informative and thought provoking figures and table. In short, the tables and figures should tell the story of your paper.
- Good balance between description, analysis and recommendations. When you draw on other sources, it is important that you not merely 'cut and paste' them into your text, but carefully integrate the underlying reasoning into your analysis.
- Clearly written and well organized.
- All prepared in MSWord Format
A high quality presentation (week of 11/25) will be clear, informative and balanced in the allocation of time to content. Your objective is to brief your classmates efficiently on your findings. All presentations should be prepared in powerpoint format as per a template to be distributed.

Examples of past final project deliverables are included in the case pack, (HP Power bar case, Diesel White paper, Maxis Case)

10. Feedback on your Performance in this Course

I am very willing to help each student group develop and polish the course deliverables. I welcome the opportunity to comment and edit drafts of student work, provided that I am given ample time. Teams or individual students can arrange meetings with me, schedule permitting.

A “draft review” schedule will be posted to the courseinfo web site once the teams are formed.

11. Kellogg Honor Code

All students are expected to abide by the Kellogg Honor Code in undertaking and completing deliverables for the assignments in this course. See Below URL for link to the Kellogg Honor Code:

http://www.kellogg.nwu.edu/stu_aff/honor/hcode12.htm

12. Acknowledgements

Some of the ideas for this course have come from many past students (see the case study researchers) and other individuals, including Mohan Sawhney, Mark Jeffery, Sunil Chopra, Holger Ernst, Rob Wolcott and others. The author acknowledges all contributions and appreciates solicited/unsolicited suggestions for improvement.
TECH-919 Innovation Process Management

Sections 61, 71 w/ Professor James G. Conley, Fall Quarter 2003
e-mail:j-conleya@kellogg.northwestern.edu

Meeting Time/Location:  Section 61: Tuesday-Friday  8:30–10:00 a.m.  Room TBD Jacobs Center
                        Section 71: Tuesday p.m.        6:00 – 9:00 p.m.  Room TBD Weiboldt Hall

Courseinfo URL's:
Section 61: http://www.courses.nwu.edu/webapps/portal/frameset.jsp?tab=courses&url=/bin/common/course.pl?course_id=_20146_1
Section 71: http://www.courses.nwu.edu/webapps/portal/frameset.jsp?tab=courses&url=/bin/common/course.pl?course_id=_27419_

Note that syllabus for this course will be a living syllabus (i.e. schedule may change a bit), posted to the above websites. All registered students will be e-mailed the living syllabus during week of 9/01. It is responsibility of each student to check on-line living syllabus regularly.

CASE PACK CONTENTS:

1. Innovating for Cash Article
2. Ryobi Outdoor Products: Kellogg/MMM Case Study
3. A Critical look at Technological Innovation Typology Journal or Product Innovation Mgmt
4. Hewlett Packard PowerBar Server Development Case Kellogg Case Study
5. The New Product Development Imperative Teaching Supplement
6. NPD at Harley Davidson Motor Company Kellogg Case Study
7. Understanding Fire Fighting in NPD Journal or Product Innovation Mgmt
8. Experience Prototyping IDEO White Paper
9. Specifications-Do we Really Understand…. Horizons Article
10. Robust Engineering Design Post Taguchi Philosophical Transactions of the Royal Society
11. Managing in an Age of Modularity Article
12. BMW: The 7-Series Project (A) Case Study
13. Team New Zealand (A) Case Study
14. Developing Products on Internet Time Article
15. Creating Project Plans to Focus PD Article
16. Maxis Software Part A Kellogg Case Study
17. Product Development in Japan Game Software Intl. Journal of Innovation Management
18. Midwest Air Technologies: The Fast Follower Kellogg Case Study
19. The Intensification of Innovation Intl. Journal of Innovation Management Case Study
20. Product Development at Dell Computer Kellogg White Paper/Case Study
21. NPD at Diesel Academic Article
22. New Offering Realization