master of science
product design and
development management
redefining product design and development
intensive program.
dynamic experience.

“We see design thinking as a process that opens horizons and opens minds. It provides a pathway toward innovation.”

– Julio M. Ottino, Dean, Robert R. McCormick School of Engineering and Applied Science
BusinessWeek ranks the mpd\textsuperscript{2} program one of the “best design thinking programs” in the world.

—Businessweek.com, September 30, 2009
**Teaching Design Thinking**

Design Thinking, which is the hallmark of the MPD² Program, is the driver for business success in today’s market. Using an interdisciplinary approach to problem solving coupled with abductive reasoning — based on questioning and exploration — leads to new product and market opportunities that challenge accepted norms and explanations. The benefit of the MPD² Program, is in learning to develop innovative solutions that also make business sense.
The Master of Product Design and Development Management Program (MPD²) grew out of our passion for creativity and innovation with respect to new product development. Walter Herbst spent his entire career building Herbst Lazar Bell into one of the largest privately held design and product development firms in the country before transferring the firm to his employees. His newest involvement is with Herbst Produkts with a concentration on design innovation. Rich Lueptow started his career in biomedical product development, but joined Northwestern University to teach engineering and design and continue his scientific research.

We recognize there are many others like us with a passion for product design and development. MPD² was conceived to provide an education in product design and development skills that so many of our colleagues wanted for themselves and for their organizations. Thus the MPD² Program was born at the Robert R. McCormick School of Engineering and Applied Science.

With our backgrounds in academia and industry and supported by an outstanding corporate advisory board, we have developed an academic program in product design and development that is now recognized as one of the top 30 in the world. The program has many unique features:

- A curriculum focused on management leadership in product design and development
- A remarkable faculty composed of experienced professionals and academics
- A convenient two, three or four-year part time program, or a 9 month full time program
- A hands-on, team-based approach to learning that draws on students’ diverse professional and personal backgrounds
- A lifetime learning opportunity that allows graduates to audit classes

We’re excited about what has become the premier master’s program in the country for product design and development management. If you want to become a leader in product development, the MPD² Program will give you the tools, expertise, and confidence to achieve your goals.

Sincerely,

Walter B. Herbst, IDSA  
Director, MPD² Program

Clinical Professor of Mechanical Engineering  
McCormick School of Engineering and Applied Science

Richard M. Lueptow, PE, ScD  
Co-Director, MPD² Program

Senior Associate Dean  
Professor of Mechanical Engineering

Clinical Professor of Marketing  
McCormick School of Engineering and Applied Science

Kellogg School of Management
“Worth every bit of intellectual sweat! MPD² is an exhilarating dive into the entire realm of product design and development.”

– Niels J. Eilmus, Senior Industrial Designer, Kohler
  MPD² class of 2011

“MPD² is the only relevant program for educating leaders for product development.”

– Tom Tobin, VP R&D, S&C Electric
  MPD² advisory board of directors

“My MPD² experience has introduced me to different lenses through which to view product design and development—the results of which are personally fulfilling and competitively advantageous.”

– Gretchen Gscheidle, Director, Insight and Exploration, Herman Miller, Inc.
  MPD² class of 2010

“The MPD² Program cultivates your skills to confidently tackle the complex and challenging problems you face outside the classroom.”

– Brandon McNamara, Business Analyst, Harley-Davidson Financial Services
  MPD² class of 2011

“MPD² has already saturated my career with priceless critical thinking, awareness, and enhanced communication skills. The true depth of this program can only be experienced.”

– Katie Cigliano Morgenroth, Industrial Design Lead, Motorola Mobility - Google
  MPD² class of 2011
The specialization that drove innovation in the 20th century increasingly falls short of the complex challenges faced in the 21st. Our interconnected world demands deep thinking in a variety of fields that can be synthesized in profound ways.

At Northwestern University we believe that process is design thinking: problem solving that frames problems correctly and produces innovative, transformative results. Design thinking is a powerful tool that can be applied to many aspects of human endeavor — from cell phones to cell biology and from business plans to public policy.
The Master of Science in Product Design and Development Management Program was founded at Northwestern University in 2002 to extend the value and power of design and design thinking in all fields. Our goal is a truly human-centered design — attuned to human abilities, desires, and needs as well as the practical realities of technology and organizations — that leads to innovation and profitable products. To this end we draw on the expertise of people from a diversity of backgrounds and interests — within Northwestern and beyond — to arrive at critical insights that spur creative solutions.
“The program went beyond teaching the mechanics of product development, it taught me how to use design as a way to approach a challenge how to ask the right questions, and what it means to work in a highly effective team. I am constantly applying the information, frameworks, and insights I learned in the MPD² Program to my client’s issues.”

– Doug Stone, VP of Innovation, Maddock Douglas
MPD² class of 2007
The Master of Science in Product Design and Development Management Program is designed for professionals eager to master the concepts and tools of product design and development management. Learn about managing creativity and design, form and function, project management, customer-focused innovation, market research and financial issues, all from the perspective of product design and development in this highly focused curriculum.

Designed to accommodate the busy schedules of design, business, and engineering professionals in the field, the graduate program takes place on Northwestern University's Evanston campus. The part time program meets one day a week on alternating Fridays and Saturdays, while the full time program meets every Friday and Saturday for 9 months.

Superb faculty, hands-on curriculum, and a convenient course schedule all come together to make this the premier program in Product Design and Development Management. The program is a must for mid to senior level professionals who are involved in the design and development of new products. Those professionals who have a passion for product design and development will learn the necessary skills to ensure themselves and their companies a leadership position.

The Master of Science in Product Design and Development Management Program boasts a unique and diverse student body. Students in the program have three to thirty years of experience with titles that include engineer, researcher, scientist, physician, designer, director and president. Students are chosen based on their background and ability to learn, as well as for their contribution to the overall program experience. MPD² students are typically sponsored by their organizations. The ideal MPD² student demonstrates outstanding initiative and drive, a passion for design, and potential for leadership and managerial growth. These product development professionals represent many premier companies including:

Abbott Laboratories
Apple
Actuant Corp.
APP Pharmaceuticals
Baxter Healthcare
Bissell Homecare, Inc.
Boomerang Brands
Bowe Bell + Howell
CareFusion Inc.
Caterpillar
Centro, LLC
Chicago Faucets
Creata Promotions
Cummins Inc.
CVS Caremark
Dow Chemical
Drumond American
Dwyer Product Corp.
Electro-Motive (GM)
Elkay
Encompass Lighting Group
Fibre Craft Materials Corp.
Flexco
Freudenberg Household Products
G & W Electric
GE Healthcare
GM, Electro-Motive Diesel, Inc.
Grainger
Hamilton Sunstrand
Harley-Davidson Motor Co.
Harken Yacht Equipment
Hatco
Herman Miller, Inc.
Hewlett-Packard
Hexion Specialty Chemicals
HLB
Honeywell
Hollister Inc.
Hospira
Hu-Friedy Manufacturing Co.
Ignite USA, LLC
Indak Manufacturing Corp.
Inspire Design Group
INTERTEK
ITW
James Hardie
Building Products
John Deere
Johnson Controls
Kohler Co.
Kraft Foods
Life Technologies
LoggerHead Tools LLC
Madison Paper Co.
Masco Product Design
McDonal's Corp.
McMaster-Carr
Medela
Medtronic Inc.
Miner Enterprises Inc.
Modine Manufacturing Co.
Motorola
Navistar Inc.
Nestle/Gerber Products
NeuroTherapeutics Pharma
Nortux
Northrop Grumman
Northwestern University
Feinberg School of Medicine
Pactiv
Panduit Corp.
Parker Hannifin Corp.
PolyScience
Procter & Gamble
QuesTek Innovations LLC
Rexnord
Robert Bosch Tool Corp.
SC Johnson & Son, Inc.
S & C Electric Co.
Sears Holding Corp.
Serigraph Inc
Shure
Solo Cup Co.
Sony Computer
Entertainment America
Southwest Rehabilitation
Spraying Systems Co.
Stepan Co.
Target
Texas Instruments
The Chamberlain Group
The Marketing Store
Transis, LLC
Transparent Container Co.
USG
Videojet Technologies, Inc.
Whirlpool
Wilson Sporting Goods
Wm Wrigley, Jr Co.
WMS Gaming Inc.
Zebra Technologies Corp.
FRAMEWORK FOR PDD LEADERS

MPD 400-0  Introduction to Product Design and Development  0.5
Overview of Design Thinking and understanding the development process. Coursework includes: phase gate, micro-segmentation, fuzzy front end, scenario planning, competitive product analyses, and manufacturing processes to determine capital and piece part variable costs.

MPD 450-0  Effective Communication  0.5
Oral and written communication in the product development environment. Communication within the corporate environment: presentations, reports, emails, and memos. External communication: interaction with clients/partners, domestic and foreign, crisis communication. Interpersonal and team communication.

MPD 442-0  Team Building and Organizational Behavior  0.5

MPD 430-0  Materials Selection  0.5
Materials selection; understanding of properties. Methodologies and procedures for material selection as a strategy; assuring suitable material for given applications. Altering properties of a same material. “Cradle to cradle” reuse practices. Composites and advanced materials.

MANAGEMENT ESSENTIALS

MPD 444-0  Negotiations/Conflict Resolution  0.5
Win-win negotiation, power in negotiation, planning and conduct of negotiation. Minimizing and resolving conflicts, tactics and ethics in negotiation. Objective standards in disputes.

MPD 420-0  Accounting Issues for Product Development  0.5
Basic accounting skills: financial reporting, statements, budgeting, corporate accounting, cost accounting, variable costing, activity based costing.

MPD 403-0  Creativity and Innovation  0.5
The human process of creativity and innovation. Tools and techniques for enhancing creativity: thinking out of the box, brainstorming. Case studies of creativity innovation and invention.

MPD 424-0  Financial Issues for Product Development  0.5
Financial skills for product development: valuation, capital structure, corporate governance, risk management, and financial modeling, including Monte Carlo methods. Product cost analysis.

MANAGING THE PROCESS

MPD 410-0  Design Strategy  0.5
Strong emphasis on right brain creative thinking, while looking at how product developers engineer for usability and design for the senses to create memorable product experiences. Study will include; getting to the right idea, ethnography, consumer empathy, creative collaboration, brainstorming, industrial design, design language, brand, storytelling, and the culture of innovation within business.

MPD 409-1  Product Design and Development I  0.5
Integration project bringing together all aspects of product development in a single hands-on team project from identification of market opportunities through ideation.

MPD 448-0  Decision Making Under Uncertainty  0.5
Probabilistic concepts, models and methods for analyzing decisions involving uncertainty are studied in a systematic, logical, and rigorous manner. Analytical thinking and problem solving skills are emphasized using conceptual, visual, mathematical and spreadsheet analyses.

MPD 415-0  Market Research  0.5
Customer involvement throughout the new product development process provides insight to enhance new product success. Key areas include: qualitative marketing research tools to provide a depth of insight into customer motivations and under-met needs; and quantitative marketing research tools to identify the best customer segments to target, measurement of brand perceptions, optimization of product features, and the development of reasonable forecasts for new products.
REFINING THE PROCESS

MPD 445-0  Statistics for Product Development  
0.5
Learning how to solve some of the most common product development problems including visual ways to
describe and optimize the performance of your product and processes, how to see differences between
design choices and how to estimate the reliability of your product. The 2 key outcomes of the course are
for each student to demonstrate the ability to obtain meaning from data and to then effectively communi-
cate this meaning to others.

MPD 404-0  Essentials of Industrial Design  
0.5
Principles of the visual aspect of design. Sketching, drawing. Cultural views of design, color theory,
texture, shape, form. The impact of industrial design on successful products.

MPD 405-0  Software Product Design and Development  
0.5
Project Management: requirements, work breakdown structure, time/cost estimation, risk management,
development methodologies, scope creep. Peopleware: motivating and maintaining productive teams.

MPD 445-0  Project Management  
0.5
Basics of project management and how to apply the techniques and key factors for success in technology
intensive projects. Matching the PM techniques to the needs of the organization.

PRODUCT DEVELOPMENT ESSENTIALS

MPD 458-0  Intellectual Capital Strategy for Product Design and Development  
0.5
This class teaches basics of Industrial Design methodology and Design thinking focusing on Design as a
problem solving method. It covers the historical context of the discipline combined with key insights into the
way designers think. Highly participatory, the class includes hands on engagements in sketching, giving
form and creating prototypes.

MPD 411-0  Lean Design  
0.5
Optimizing design for manufacturing, recycling, serviceability, upgradeability, reliability, safety, life-cycle.
Predicting product costs. Strategy for platforms, motivation, management implementation.

MPD 406-0  Human Factors  
0.5
Human factors in design. User centered design methods, human sensation, perception, cognition, implication
for industrial design. Design of displays, controls, workspaces, and human-computer interactions. Design for
differing abilities.

MPD 408-0  Global Product Design and Supply Chains  
0.5
The challenges and opportunities of global product development. Recent history, economic conditions and
the techniques pursued by companies competing in the global economy. Leveraging the global supply and
design chains across a variety of industries and contexts. regression, contingency tables.

INTEGRATION

MPD 402-0  The Management of Product Innovation  
0.5
Product innovation strategy for creating pipelines of innovative products. Planning, organizing and creating
a product innovation culture. Innovation roadmaps, resource deployment, competencies, partnerships and
alliances for sustained innovation productivity.

MPD 401-1  Principles of Marketing  
0.5
Understanding and integration of key marketing principles into the product development process.
Pricing, distribution channels and marketing communication/messaging. Identification and application of
segmentation, targeting, positioning, packaging and branding techniques to launch a new product or to
restage an existing product.

MPD 449-0  Values Based Leadership  
0.5
The challenges of leadership of product development teams in a corporate or entrepreneurial environment.
Approaches to leadership, developing leadership skills, mentoring leadership skills in others, ethical leadership.

MPD 409-2  Product Design and Development II  
0.5
Culmination of integration project bringing together all aspects of product development in a single
hands-on team project from ideation through product prototyping.
REQUIREMENTS

Applicants to the Master of Science in Product Design and Development Management (MPD²) Program typically have an undergraduate degree in design, engineering, related scientific or technical fields. Individuals with other degrees and/or appropriate work experience related to product design and development should also apply. A minimum of three years of work experience is required in addition to the submission of a technical or product design and development portfolio. For admission to the program, the applicant must submit evidence that he or she is likely to achieve at least a B grade point average at Northwestern University. The best evidence of this capability is a transcript indicating a B-level or higher grade point average at a comparable academic institution, but evidence of professional experience is given considerable weight.

A completed application includes a portfolio of professional work as well as transcripts. An interview with the Program Director must be conducted before the application is considered complete. Following acceptance into the program the applicant’s employer must supply a letter of recommendation attesting to the employer’s understanding of the schedule and academic requirements of the program.

TRANSCRIPTS

All colleges and universities attended must be listed on the application form, whether or not a degree has been earned, and an official transcript from each institution must be filed with the application. An official transcript bears the original signature or seal of the registrar and/or the issuing institution. Unofficial transcripts are helpful for preliminary evaluation, but they are not acceptable for admission.

LOCATION

All classes are held on the Evanston campus of Northwestern University.

DEGREE

Successful completion of the MPD² Program results in a Master of Science in Product Design and Development Management degree from the Robert R. McCormick School of Engineering and Applied Science, Northwestern University.
SCHEDULE
At Northwestern, courses are taught on a quarterly schedule and a master’s degree requires 12 course credits (2 credits/quarter). The MPD² Program follows the Northwestern University academic schedule with breaks in December, March, and during the summer. The part time MPD² Program may be completed in six quarters (Fall, Winter, Spring) over two years, with a new class of students beginning each September. Students may choose to extend the normal 2 year part time program into a 3 or 4 year program. A full time program is also available and is completed in 9 months. Courses meet on alternating Fridays and Saturdays for part time students and on both Fridays and Saturdays for full time students.

TUITION
Tuition for the two year program is paid in each of the three quarters during the academic year. The total program cost is approximately $58,140. Books, parking permits and meals are provided.

FINANCIAL AID
MPD² students who are U.S. citizens or permanent residents are eligible to apply for federal loan funds through the Financial Aid Office. For more information about loans, visit the Financial Aid Office website: www.northwestern.edu/sfs/financial_aid/offices.html

Loan applications must be submitted directly to the Financial Aid Office.

Minimal scholarships from MPD² may also be available.

A TYPICAL DAY IN THE MPD² PROGRAM

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>8:00 A.M. — 9:00 A.M.</td>
<td>Continental Breakfast</td>
</tr>
<tr>
<td>9:00 A.M. — 10:30 A.M.</td>
<td>Class 1</td>
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<tr>
<td>10:30 A.M. — 10:45 A.M.</td>
<td>Morning Break</td>
</tr>
<tr>
<td>10:45 A.M. — 12:00 P.M.</td>
<td>Class 1</td>
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<tr>
<td>12:00 P.M. — 1:00 P.M.</td>
<td>Lunch</td>
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<tr>
<td>1:00 P.M. — 2:15 P.M.</td>
<td>Class 2</td>
</tr>
<tr>
<td>2:15 P.M. — 2:30 P.M.</td>
<td>Afternoon Break</td>
</tr>
<tr>
<td>2:30 P.M. — 4:00 P.M.</td>
<td>Class 2</td>
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The Master of Science in Product Design and Development Management Program at Northwestern University features outstanding faculty from the Robert R. McCormick School of Engineering and Applied Science, the Kellogg School of Management, the Law School and the Weinberg College of Arts and Sciences, as well as leading experts practicing in the field of product design and development.

The faculty are all leading practitioners and scholars of distinction, well known for their experience in user research, strategy, and new product development processes. MPD² faculty members regularly serve as consultants to industry and government. This familiarity with current trends and challenges enables them to provide MPD² students with cutting edge approaches to new product management problems and solutions.

**Walter B. Herbst, IDSA**
Director MPD² Program
Clinical Professor of Mechanical Engineering
McCormick School of Engineering and Applied Science
Scholar Northwestern Center for Engineering Education Research
Clinical Professor of Marketing
Kellogg School of Management
Founder HLB
Herbst Produkt

**Richard M. Lueptow, PE, ScD**
Co-Director MPD² Program
Senior Associate Dean
Professor of Mechanical Engineering
McCormick School of Engineering and Applied Science

**David Austen-Smith, PhD**
Peter G. Peterson Professor of Corporate Ethics
Senior Associate Dean
Kellogg School of Management

**John Boyce**
Adjunct Lecturer MPD² Program
McCormick School of Engineering and Applied Science
Senior Vice President of Human Resources
Centro Media

**Russell J. Branaghan, PhD**
Visiting Professor MPD² Program
McCormick School of Engineering and Applied Science
Assistant Professor of Applied Psychology
Director of Human Technology
Interaction Laboratory
Arizona State University
Founder
Research Collective

**Dan Brown**
Clinical Associate Professor
Segal Design Institute
McCormick School of Engineering and Applied Science
President
Logger-Head Tools

**Stephen H. Carr, PhD**
Associate Dean for Undergraduate Engineering
Professor of Materials Science and Engineering
McCormick School of Engineering and Applied Science

**James G. Conley, PhD**
Clinical Professor
Center for Research in Technology & Innovation
Kellogg School of Management
Principal
Winnemac Consulting

**Phillip Corse**
Adjunct Associate Professor
MPD² Program
McCormick School of Engineering and Applied Science
Lecturer of Global Marketing
Kellogg School of Management
Adjunct Professor of Marketing
Thunderbird School of Global Management
CEO
Marketing Connections Group

**Sudhakar D. Deshmukh, PhD**
Charles E. Morrison Professor of Decision Sciences
Kellogg School of Management

**Mark Dziersk, FIDSA**
Adjunct Professor MPD² Program
McCormick School of Engineering and Applied Science
Managing Director
LUNAR
Anthony P. Orzechowski
Adjunct Lecturer
MPD Program
McCormick School of Engineering and Applied Science
Director of R&D Quality
Engineering
Abbott Diagnostics

Mitchell A. Petersen, PhD
Glen Vasel
Professor of Finance
Chair of Finance Department

Christopher K. Riesbeck, PhD
Associate Professor of Electrical Engineering and Computer Science
McCormick School of Engineering and Applied Science
Vice President
Acuwmenical

Russell W. Scalpone, PhD
Adjunct Lecturer
MPD Program
McCormick School of Engineering and Applied Science
Corporate Director
Organizational Effectiveness & CQI
SSM Healthcare

Robert Schieffer
Clinical Associate Professor of Marketing
Kellogg School of Management
President
Schieffer and Associates

Mark Werwath, PhD, PMP
Director
Masters of Engineering Management Program
McCormick School of Engineering and Applied Science
Associate Director
Farley Center for Entrepreneurship and Innovation
Clinical Associate Professor
Industrial Engineering and Management Sciences
Clinical Associate Professor
MPD Program

STAFF
Karen Healy Stover  Associate Director
Lee A. Cabot  Program Assistant
The Ford Motor Company Engineering Design Center is the home of the Master of Science in Product Design and Development Management Program. It received Silver Certification in the Leadership in Energy and Environmental Design (LEED) Green Building Rating System (the first building at Northwestern to do so) and is the physical and virtual center for collaboration and design at Northwestern. It contains classrooms, offices, and conference rooms as well as prototyping laboratories that include machine tools, rapid prototyping equipment, and CAD stations.
THE UNIVERSITY
Northwestern University was chartered in 1851 as an independent institution of higher education in Illinois to serve the people of the Northwest Territory, and its growth has paralleled the dynamic rise of Chicago, the metropolitan focus of the original Northwest Territory. In 1853, the founders purchased a 379-acre tract of farmland along Lake Michigan, 12 miles north of Chicago. The town that grew up around the University was named Evanston in honor of one of the University’s founders, John Evans.

After completing its first building in the fall of 1855, Northwestern opened its doors with two faculty and ten students. By 1900, Northwestern was a university composed of seven graduate and undergraduate schools with 2,700 students and an annual budget of more than $200,000.

Today, Northwestern is a major private research university with more than 17,000 students enrolled in twelve academic divisions on two lakefront campuses, about 2,500 full time faculty and 4,600 employees, and an annual budget on the order of $1.5 billion. Northwestern has fulfilled the expectations of its founders to establish “a university of the highest order of excellence.”

THE EVANSTON CAMPUS
Stretching for nearly a mile along Lake Michigan, the Evanston campus is situated in the first suburb north of Chicago, about 12 miles from the downtown center called the Loop. The university occupies nearly 240 acres in Evanston.

On the Evanston campus about 13,000 full time students are enrolled in The Graduate School, the Weinburg College of Arts and Sciences, the McCormick School of Engineering and Applied Science, the School of Education and Social Policy, the Medill School of Journalism, the School of Music, the School of Communication, the Kellogg School of Management, and the School of Continuing Studies.
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Rev5 / 0513
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