

IPD

Integrated Product Development 2016

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Class Meetings Tuesdays and Thursdays, 10:30 – 1:20 pm in the Integrated Innovation Institute, unless marked or communicated otherwise. The classes will be conducted as a studio experience integrating lecture, discussion and activities during sessions.

Textbook *Creating Breakthrough Products (2nd ed): Revealing the Secrets that Drive Global Innovation* (2013), Jonathan Cagan & Craig M. Vogel. Upper Saddle River, NJ: FTPH.

6 Sponsors: Jarden, Opus Mach, Volvo Equipment Corporation, Johnson & Johnson, Ingersoll Rand, and Emirates

Overview

The IPD course focuses on team-based integrated product development incorporating skills from engineering, business, and design disciplines. The course consists of four modules: identifying, understanding, conceptualizing and realizing a product/service opportunity.

MBA students will join the MII-PS students in this course. There will be eight teams in the course. Teams are determined by faculty in advance with consideration of student preferences.

The six corporate sponsors will support the course with problem statements, company context, and feedback. Two teams will be assigned to Jarden, one to Opus Mach, one team to Volvo, two to J&J, one team to Ingersoll Rand, and one team to Emirates. The goal of having multiple sponsors is for the students to see how the methods taught are broadly applicable. The sponsors' primary goal is to follow the IPD process, learn and respond to each team's research, insights, and interpretations within the assigned opportunity.

The sponsors have provided the course with very challenging opportunity areas in industry and the potential to create a product/service concept that is valuable to the sponsors through a partnership with sponsor personnel in the area of new product development.

Working in Teams

Team Processes

This class will assist students in learning how to integrate differing styles and opinions into a common approach shared by all members of the team. Your instructors will be available throughout the semester to support this goal.

Roles and Responsibilities

A new team leader must be chosen for each phase. The leader:

- Coordinates discussion when meeting with faculty
- Coordinates weekly meetings outside of class
- Coordinates the distribution of responsibilities for the phase they lead

Meetings

Each team should use conventions that promote successful meetings. Methods for structuring and analyzing information and decision-making will be discussed during the semester.

Videos

Each team will make two short videos about their project. Details will be discussed during the semester.

Presentations and Reports

Teams must distribute and rotate responsibilities for presentations and reports. At each phase an oral presentation will be due with supporting material. For phases 2 and 4 a written report is also required. All deliverables for each phase will be posted to the Box folder established for the course. Specific deliverables at the end of each phase are as follows:

- Phase 1, each team will deliver a PowerPoint presentation and supplementary materials, and a 3-page written overview in Word of the phase and opportunity.
- Phase 2, each team will deliver a PowerPoint presentation and written report in Word; this is an extensive report and covers everything with respect to your project from Phases 1 & 2; unlike the Phase 1 overview, this will be a lengthy report.
- Phase 3, each team will deliver a PowerPoint presentation and supplementary materials.
- Phase 4, each team will deliver a PowerPoint presentation, a comprehensive written report in Word, a PDF of each saved in a reduced file size, and supporting materials such as CAD, videos, etc. Teams must make sure all presentations and written reports are in Box. In addition teams must also deliver:
 - a document that has each team member's permanent mailing address and email
 - a filled out provisional patent application cover sheet in case the sponsor wishes to file provisional patent applications.

NOTE: All documents must include the names of team members and be well formatted (date, page numbers, cover/title sheets if applicable, etc.).

Intellectual Property

Sponsors will have the first right to ownership of the project ideas produced by the teams in this course. If patents are filed and awarded students will have their names on all patents based on their project. Sponsors will pay all patenting costs and will pay each student \$500 whose project is submitted for patenting by the sponsor. Sponsors also have the right to commercially use projects that are not patented but sponsored by them. In this case students will receive a letter from the sponsor acknowledging their contribution and \$500. Sponsors have the right to file a provisional patent application in the students' names; this will not be considered a full patent application and will not result in payment to the student. In addition, each student may use their project in their portfolio after the final presentations of the class are complete. Carnegie Mellon (and the Integrated Innovation Institute) may also use the projects for publication and other non-commercial uses.

Each student who takes this class must sign an agreement to the above as well as a non-disclosure agreement with their sponsoring company; the agreement will be distributed prior to or in the first class. Students are not allowed to share confidential information with anyone who has not signed an NDA that covers that material. For example, confidential information cannot be shared across teams unless both teams have signed NDAs covering that information. Carnegie Mellon University has agreed to all terms with all sponsors.

Reimbursements

Student teams will be given a budget for the course. Students should work with the Emma Zink to purchase all large ticket items for research and prototypes. If students pay for items directly they will be reimbursed for the item but will not be reimbursed for taxes; this is a university policy (see note below). Students should submit receipts to Emma's administrative assistant. Each student must submit his or her own receipts for reimbursement. You must complete the reimbursement form (a separate document containing the form and explaining the details will be provided) so your team expenses can be tracked. ALL receipts MUST be submitted for reimbursement BEFORE Wednesday, May 11th.

NOTE: You will NOT be reimbursed for TAXES! The university does not pay taxes and will not reimburse them. If your expense requires tax you can inform Emma's administrative assistant in advance so that your request can be purchased through the university or provide you a purchase order. Note that shipping is reimbursable.

Course Structure and Deliverables

The semester is partitioned into the following four (4) phases: identifying, understanding, conceptualizing and realizing a product/service opportunity. Throughout the phases teams must gather information, evaluate the quality and relevance in order to gain insights, and develop well-supported arguments that lead to a single well-resolved proposal. Teams will leverage prior curricula learning including those provided in IPD Methods, User Research Methods, and other courses. Additional support for these phases will be provided through lectures and discussions in the course. Below is a reference chart of course activities followed by more specific goals for each phase.

	Research/Exploration	Methods	Output/Decisions
Phase 1: Identify	Identifying Opportunities	Multiple options	Choosing an Opportunity
Phase 2: Understand	Gathering data In-depth understanding	Multiple data sets	Determining the Opportunity's Constraints
Phase 3: Conceptualize	Translation and Visualization	2D, 3D, and potentially 4D thinking and making based on defined product/service criteria	Choosing a Product/Service Concept from a broad range of explorations and studies
Phase 4: Realize	Producing and communicating the product/service opportunity	Refinement Specifications	Proving the Concept

Phase 1: Identifying an Opportunity

Overarching Activities:

1. Team Formation
2. Searching for Possible Opportunities
3. Choose One Opportunity
 - A. Opportunity must be user driven
 - B. Opportunity for a product/service must be part of an experience supported by the SET Factors
 - C. Opportunities must be described in the context of a scenario

Specific Goals and Requirements:

1. Team Formation
 - A. Get together as a team and do something fun not related to the course
 - B. Choose a team leader for this phase
 - C. Develop and turn in a team contract
2. Methods for Identifying and Choosing Opportunities:
 - A. Identifying Social, Economic, and Technology (SET) factors
 - 1) Observation: in situ environments
 - 2) Interviews
 - 3) Personal experience
 - 4) Literature research/web research
 - 5) Secondary sources
 - 6) Consult experts for emerging trends
 - B. Methods for identifying opportunities
 - 1) Brainstorming
 - 2) Fishbone
 - C. Methods for decision making
 - 1) Opportunity matrix

- 2) Listing opportunities
 - a. List reduction
 - b. List integration
 - 3) Opportunities mapped against criteria decision
 - 4) Weighted voting
3. Criteria for Choosing an Opportunity:
 - A. Would products/services that fulfill this opportunity potentially be useful, usable and desirable?
 - B. Does the team agree and is it motivated to tackle the problem?
 - C. Does the problem have appropriate challenges for all members and disciplines?
 - D. Is it a manageable problem given the constraints of the course?
 - E. Is it a significant product/service opportunity, not just a minor modification of an existing product/service?
 - F. Is there a potential market?
 - G. Does the opportunity fit within the company brand boundaries?
 4. Presentation: Define Product/Service Opportunity
 - A. Brief general statement of product/service opportunity
 - B. Describe opportunity within the context of a scenario
 - C. Present initial SET Factors
 - D. Present argument and evidence of the importance of the opportunity
 - E. Highlight process
 - F. Provide supporting materials

Phase 2: Understanding of the Opportunity

Overarching Activities:

1. Gathering Information
2. Structuring Information
3. Establishing General Product/Service Criteria
4. Becoming an Expert
5. Developing "High Performance" Team Focused on the Opportunity

Specific Requirements:

1. Team Leadership and Responsibilities
 - A. Choose new team leader for Phase 2
 - B. Subdivide and share team responsibilities
2. Methods for Understanding Value and Value Opportunities
 - A. Primary research
 - B. Secondary research/library reference
 - C. Insights from external experts
 - 1) Identify advisors/early adopters
 - 2) Identify heavy users
 - D. Case studies
 - E. Identify all stakeholders
 - F. Determine needs of all stakeholders
 - G. Diagram product/service characteristics
 - H. Reverse engineering
 - I. Patent search
 - J. Technology search
 - K. Competitive analysis of similar functioning products/service
3. Understand Qualitative User Research in Context: Study users to understand needs, wants and desires with respect to:
 - A. Specific use of the product/service
 - B. Environment/space factors
 - C. Interactive considerations: How do people behave prior to, during, and after the activity?
 - 1) Psychological

- 2) Physical – range of motion, range of size
 - 3) Human Factors (detailed task analysis)
 - D. Effective use of tools Including: ethnography, task analysis, lifestyle reference, human factors/ergonomics, interviews of expert users
- 4. Define the Product/Service Semantics
 - A. Develop a qualitative sense of the product/service
 - B. Develop a list of descriptive adjectives
- 5. Visualize/Represent Team Understanding in Various Ways
 - A. Diagrams
 - B. Lists
 - C. Photographs
 - D. Collage of images – “mood board”
 - E. 2D conceptual sketches or illustrations of potential product/service ideas
 - F. 3D conceptual sketches through low-fidelity physical mock ups
 - G. Value Opportunity Analysis (VOA) with context specific definitions representing current state
 - H. VOA converted to goal state specifications
 - I. Positioning maps
 - J. Revised SET factors
- 6. Decision Making: Determining the Product/Service Constraints: Develop a more focused scenario and opportunity statement
 - A. What are the gross/generic constraints?
 - 1) What is the purpose of the product/service?
 - 2) Who is the target user?
 - 3) How will it be sold?
 - 4) Who are the major competitors?
 - B. Where will the product/service reside?
 - C. What attributes should this product/service have?
 - 1) Physical and functional features
 - 2) Psychological descriptors
 - 3) Experiential and symbolic
- 7. Presentation and Report: Define the Product/Service Criteria
 - A. Present product/service criteria including VOA goals and context specific definitions for VOA
 - B. Describe what the eventual product/service will accomplish
 - C. Present user/stakeholder analysis
 - D. Present update scenario
 - E. Describe market focus and potential
 - F. Support decisions by highlighting your process
 - G. Produce a video that conveys the opportunity and justification from user research findings and using story-telling methodology.

Phase 3 Conceptualizing the Opportunity

Overarching Activities:

1. Generate Multiple Product/Service Concepts
2. Synthesize and Evaluate Product/Service Concepts
3. Select One Product/Service Concept to be Developed

Specific Requirements:

Develop a concept that is useful, usable and desirable based on, and tested against, criteria established in Phase 2.

1. Create Concepts Through Broad Explorations and Iterative Investigations
 - A. Visualize multiple concepts using informed assumptions through drawing and modeling

- B. Concepts and assumptions should be refined/redirected based on insights gained from testing with all advisors and against the criteria established in Phase 2.
 - C. Repeat the testing and refinement cycles as many times as possible with a goal of at least 3 cycles.
2. Decision Making: Choosing a Concept
 - A. How do concepts compare to your product constraints?
 - B. Which concepts best match the criteria established in Phase 2?
 - C. Which concept is best supported by your advisors and target market?
 - D. How does technology considerations impact concept selection?
 3. Methods for Visualizing and Decision Making
 - A. Prototyping Ideas (2D, 3D, and 4D; physical and virtual)
 - B. Patents search results
 - C. Pugh charts
 - D. Revised Value Opportunity Analysis (VOA) as necessary
 - E. Identification and feasibility of technical options
 - F. Materials research and manufacturing options
 - G. In-depth interviews through focus groups and/or individuals, questionnaires
 4. Other Key Issues to be Refined in Phase 3
 - A. Market Requirements
 - 1) Approximate cost and pricing
 - 2) Consumer expectations
 - 3) Performance
 - 4) Appearance
 - 5) Purchase decisions
 - 6) Differentiation from competition
 - B. Product Form
 - 1) Aesthetics overall and defining and applying Visual Brand Language of the company
 - 2) Human factors and interactions (physical and UI)
 - 3) Materials
 - C. Technology/Manufacturing
 - 1) Core mechanical/electrical components
 - 2) Manufacturing process
 - 3) Safety and reliability issues
 - 4) Cost
 5. Presentation of Concept
 - A. Review of the opportunity
 - B. Illustrate the product/service concept in detail through drawings, virtual/digital simulations, and physical representations
 - C. Justify usefulness, usability, and desirability:
 - 1) Market and cost potential
 - 2) Features and functionality/technology
 - 3) Form, aesthetics, and lifestyle
 - D. Communicate VOA goals and specifications
 - E. Highlight key aspects of the process in support of concept
 - F. Provide supporting materials that justify your concept

Phase 4 Realizing the Opportunity

Overarching Activities:

1. Refine and Detail Product/Service Concept
 - a. Develop high quality form and functional virtual models and simulations in support of physical models that may be lower fidelity
 - b. Marketing plan
 - c. Manufacturing plan

2. Communicate in detail the potential success of the product/service in a comprehensive report

Specific Goals and Requirements:

A logical, well-written argument/report, narrated PowerPoint presentation, and a well-represented physical and virtual prototype that supports the useful, usable, and desirable criteria of your product.

1. Virtual and functional prototypes represented in CAD with appropriate supportive physical models.
2. Refine scenario in the presentation that clearly communicates the value of the solution to the primary users
3. Prove Marketing, Engineering and Design Concepts
 - A. Company and target market issues
 - 1) Case for profitability (including timeframe)
 - 2) Target users
 - 3) Product configuration
 - 4) Distribution
 - 5) Communication
 - 6) Price
 - 7) Connection to brand & company
 - 8) Differentiation from competition
 - B. Human factors resolution and feedback from potential consumers
 - 1) Interface (physical and UI, as applicable)
 - C. Manufacturing feasibility and costs
 - 1) Processes
 - 2) Materials
 - D. Technology:
 - 1) Electrical
 - 2) Mechanical
 - E. Justification of product features
 - F. Visual language and its relation to the company visual brand
4. Methods for Refinement and Presentation
 - A. Visual representation (2D, 3D, and 4D modeling)
 - B. Functional representation (specifying and or creating components/features)
 - C. Target market input and analysis, incl. pricing
 - D. Technology proposal and feasibility
 - E. Manufacturing processes selection and material determination
 - F. Cost analysis
 - G. Risks and Contingencies
5. Research
 - A. Material and Manufacturing searches
 - B. Feedback from expert users/advisors
 - C. Feedback from target market users
 - D. Revisit VOA and justify product
6. Report Content
 - A. Inclusive of entire process (from start to finish)
 - B. Include pertinent information from Phases 1-3
 - C. Update prior phase information as necessary
 - D. Detail final product developed in Phase 4 in the integrated team approach with all disciplines represented. This includes communication of form model, functional representation, manufacturing plan, marketing plan with financials, and roll out strategy.
7. Presentation Content
 - A. Focus on communicating the final product/service value and function in context and in detail
 - B. Briefly highlight pertinent information from Phases 1-3 to support justification
 - C. Present form model, functional representation, manufacturing plan, marketing plan with financials and roll out strategy
 - D. Justify product features, form, costs and marketing approach using stakeholder research in phase 4

- E. Present 1 to 2 minute video conveying the opportunity and product-solution, using story telling methodology

Assessment & Grading

There will be three faculty leads that will manage several teams each. Profs Anderson and Boatwright will each have 3 teams and Profs Kara will have 2 teams. However there will be an occasion where the faculty will rotate during team meetings. Teams can also request to meet with a faculty who is not the lead of their team for questions and feedback.

All faculty will attend and assess the presentations of all teams and contribute to the team grades for each phase and the course. Your additional learning will also come as a result of seeing how other teams develop their work. You will be individually required to attend four team presentations at the end of each phase: all the team presentations that your faculty lead manages plus a minimum of one or two other team presentations of your choosing, depending on your faculty lead. More specifically, teams managed by Profs Anderson and Boatwright will be required to attend the 3 presentations of their faculty lead plus one other presentation. Prof Kara's teams will be required to attend his teams' presentations plus two other presentations of their choosing. You are welcome and invited to attend additional presentations as well.

Each phase will be assessed on the work performed in the following areas:

- **Research & Innovation Process:** This encompasses the effectiveness of the team to follow the IPD process as taught in IPDM and supplemented in the IPD class during lecture, meetings with faculty, and through the textbook. The approach is based on the belief that a good product/service is great for the moment, but a good process will be great over your professional career.
- **External Communication:** This consists of written overviews or reports and an oral presentation at the end of each of the four phases. High quality communications are clear, concise, compelling, and well organized.
- **Product Opportunity:** This represents high quality products/services that are useful, usable and desirable. These three terms have equal meaning for each discipline. Each product/service developed for this course will be measured by its ability to satisfy these terms evidenced by your work to understand their meanings with regard to criteria, your concept selection, and delivery of a final prototype(s) that address form and function, and a marketing plan. These terms were made popular by the international design firm Fitch as the cornerstone of their product development philosophy and are now widely used across design disciplines. In the context of this class the terms are define as follows:
 - **Useful:** Does the product satisfy a true human need? Is it feasible to manufacture? Is there a market for it?
 - **Usable:** Is the product easy to learn and use? Is it intuitive to use? Is it safe to use? Is it reliable?
 - **Desirable:** Do the technology, function, appearance and market positioning make it a product that consumers will want purchase?

The grade percentage for each phase is: Phase 1 (10%), Phase 2 (25%), Phase 3 (25%), and Phase 4 (40%). Grading is based on the research and innovation process, the evolution of the product opportunity, and the external communication (report and presentation). The faculty team expects to give each member of a student team the same grade based on the work produced by a normally functioning team as evaluated both by team members and the faculty. Based on team feedback and faculty assessment, a student's grade can be different from the team.

Each phase will be assessed and a letter grade given to each team during a meeting following the phase presentation.

NOTE: Meeting the requirements in full results in a grade of B. To receive an A, teams must deliver results that are synthesized, insightful and exceptional.

Working Schedule

Week 1	Tuesday Jan 12	Thursday Jan 14	Friday Jan 15
Identifying the Opportunity	<p>Presentations and Problem Introductions:</p> <ul style="list-style-type: none"> 10:30, Introductions 10:35-11:35, Volvo 11:40-12:10, lunch 12:15-1:15, Thermo King <p>Any students who missed the earlier deadline will need to:</p> <ul style="list-style-type: none"> Review and complete project NDAs and assignment agreement prior to the start of class 	<p>Presentations and Problem Introductions:</p> <ul style="list-style-type: none"> 10:30, Introductions 10:35-11:35, Rawlings 11:40-12:10, lunch 12:15-1:15, Ball® <p>In your teams:</p> <ul style="list-style-type: none"> Conduct initial market research and a comprehensive list of SET factors Write team contracts after discussion of individual expectations in your teams Overview of the video assignments (at the end of phases 2 and 4) so that you can begin planning and capturing footage Begin POG Generation <p>For next class (Tuesday):</p> <ul style="list-style-type: none"> Read Chapter 1 & 6 – and any supplemental materials 	<p>Presentations and Problem Introductions:</p> <ul style="list-style-type: none"> 10:30-11:30, Opus Mach 11:30-12:10, lunch 12:15-1:15, J&J 1:45-2:45, Emirates
Week 2	Tuesday Jan 19	Thursday Jan 21	
	<p>Assignments Due:</p> <ul style="list-style-type: none"> Team Contracts SET factors Read Chapter 1 & 6 – and any supplemental materials Initial list of POGs <p>In Class:</p> <ul style="list-style-type: none"> Persona and Scenario development review Stakeholder Analysis Review Ethnography and user based research discussion Continue POG generation <p>Team Meetings:</p> <ul style="list-style-type: none"> Teams meet with faculty leads 	<p>Assignments Due:</p> <ul style="list-style-type: none"> Read Chapter 7 List of POGs Team bonding activity (verbally report) <p>In Class:</p> <ul style="list-style-type: none"> List reduction and criteria, review Phase 1 example presentation and discussion <p>Team Meetings:</p> <ul style="list-style-type: none"> Teams meet with faculty leads 	
Week 3	Tuesday Jan 26	Thursday Jan 28	
	<p>Assignments Due:</p> <ul style="list-style-type: none"> New work/materials for team work and discussion with faculty Phase 1 draft <p>In Class:</p> <ul style="list-style-type: none"> Studio working session <p>Team Meetings:</p> <ul style="list-style-type: none"> Teams meet with faculty leads but also direct discipline-specific questions to other faculty as needed 	<p>Assignments Due:</p> <ul style="list-style-type: none"> Phase 1 presentations to faculty and class <p>In Class:</p> <ul style="list-style-type: none"> Phase I Presentations to faculty and class for discussion (10 minute presentations then Q&A). NOTE: See presentation attendance requirements above in “assessment and grading” section. Studio Working Session for teams not attending 	

		presentations	
Week 4	Tuesday Feb 2	Thursday Feb 4	
Understanding the Opportunity	<p>Assignments Due:</p> <ul style="list-style-type: none"> 3 page opportunity identification and summary to send to sponsors Updated work based on faculty feedback <p>In Class:</p> <ul style="list-style-type: none"> Storytelling discussion Research questions discussion Activity: develop stories <p>Team Meetings:</p> <ul style="list-style-type: none"> Teams meet collectively with their shared faculty lead, to discuss presentations from last week 	<p>Assignments Due:</p> <ul style="list-style-type: none"> Read Chapters 2 and 3 For <i>Meta-Technologies and Innovation Leadership</i>, read pages 120-123 and 138-141, and skim the rest. Develop research questions Refine target stakeholders and provide descriptions Clarity on research questions <p>In Class:</p> <ul style="list-style-type: none"> Positioning discussion Value Opportunity Analysis discussion <p>Team Meetings:</p> <ul style="list-style-type: none"> Teams meet with faculty leads 	
Week 5	Tuesday Feb 9	Thursday Feb 11	
	<p>Assignments Due:</p> <ul style="list-style-type: none"> VOA definitions VOA – current state Develop positioning map <p>In Class:</p> <ul style="list-style-type: none"> Studio working session on competitive state and goal state VOAs <p>Team Meetings:</p> <ul style="list-style-type: none"> Teams meet with faculty leads but also direct discipline-specific questions to other faculty as needed 	<p>Assignments Due:</p> <ul style="list-style-type: none"> Materials to class for image board activity Review of chapter 7 <p>In Class:</p> <ul style="list-style-type: none"> Technology Benchmarking and patent search Phase II deliverables and expectations Value based product specs: implications of VOA – discussion and activity Lifestyle reference discussion Activity: Create Image Boards <p>Team Meetings:</p> <ul style="list-style-type: none"> Teams meet with faculty leads 	
Week 6	Tuesday Feb 16	Thursday Feb 18	Friday Feb 19
	<p>Assignments Due:</p> <ul style="list-style-type: none"> Turn in competitive and goal state VOAs Present image boards <p>In Class:</p> <p>Studio working session to prepare Phase II presentations and reports</p>	<p>Assignments Due:</p> <ul style="list-style-type: none"> Phase II presentation draft Video draft Outline of extensive report covering phases 1 & 2 <p>In Class:</p> <p>Studio working session to prepare Phase II presentations and reports</p>	<p>On site Phase II presentations (20 minutes including the video, followed by Q&A)</p> <ul style="list-style-type: none"> 9:00am -- J&J teams in New Jersey 2:30pm -- Volvo team in Shippensburg, PA
Week 7	Monday Feb 22	Tuesday Feb 23	Thursday, Feb 25
	<p>Assignments Due:</p> <ul style="list-style-type: none"> Emirates and Opus Mach presentations <p>Phase II Presentations and feedback (presentations are 20 minutes including the video, followed by Q&A)</p> <ul style="list-style-type: none"> 8:30-9:00am, Emirates Phrase II 	<p>Assignments Due:</p> <ul style="list-style-type: none"> Rawlings, Ball, and Ingersoll Rand presentations <p>Phase II Presentations (20 minutes followed by Q&A)</p> <ul style="list-style-type: none"> 10:30-11:00, Rawlings 11:05-11:35, Ball 	<p><u>No class</u> due to Confluence</p>

	<p>presentation</p> <ul style="list-style-type: none"> 9:00-9:20, faculty meet with Emirates team 9:25-9:45, faculty meet with J&J men's team 9:50-10:10, faculty meet with J&J women's team 10:15-10:35, faculty meet with Volvo team 1:00-2:30pm, Opus Mach Phase II presentation (the additional time is to allow for an extended discussion after the presentation with Opus Mach) 	<ul style="list-style-type: none"> 12:30-1:15, Ingersoll Rand (includes extended discussion) 	
Week 8	Tuesday Mar 1	Thursday Mar 3	
Conceptualizing the Opportunity	<p>Assignments Due:</p> <ul style="list-style-type: none"> Report due covering Phases 1 & 2, all teams <p>In Class:</p> <ul style="list-style-type: none"> Phase 3 deliverables discussion Product conceptualization from VOA discussion Conceptualization strategies and physical prototyping discussion <p>Team Meetings:</p> <ul style="list-style-type: none"> Ingersoll Rand, Opus Mach, and Jarden meet individually with all 3 faculty members for Phase II feedback (20 minutes each) 	<p>Assignments Due:</p> <ul style="list-style-type: none"> Concepts for VOA attributes (as a result of today's in-class activity) Concept exploration drawing and modeling activity <p>In Class:</p> <ul style="list-style-type: none"> 6-3-5 Method of generating concepts (2D) 	
Week 9	Tuesday Mar 10	Thursday Mar 12	
	NO CLASS	SPRING BREAK	
Week 10	Tuesday Mar 15	Thursday Mar 17	
	<p>Assignments Due:</p> <ul style="list-style-type: none"> User feedback over spring break <p>In Class:</p> <ul style="list-style-type: none"> Conceptualization – by the end of class, 10 <i>additional</i> ideas per team member minimum (sketches), and three physical mockups, minimum. Deep Dive (<i>video and discussion</i>) Phase 3 prototyping <p>Team Meetings:</p> <ul style="list-style-type: none"> Teams meet with faculty leads 	<p>Assignments Due:</p> <ul style="list-style-type: none"> Material for build-a-thon Continued conceptualization Developing strategies and connections to users to get feedback <p>In Class:</p> <ul style="list-style-type: none"> Build-a-thon activity 	
Week 11	Tuesday Mar 22	Thursday Mar 24	
	<p>Assignments Due:</p> <ul style="list-style-type: none"> Read Chapter 4 Reading on Pugh Charts <p>In Class:</p> <ul style="list-style-type: none"> Business Model Discussion Pugh charts activity Develop selection criteria Revisit Phase II deliverables & expectations 	<p>Assignments Due:</p> <ul style="list-style-type: none"> Updated conceptualization work and testing <p>In Class</p> <ul style="list-style-type: none"> Studio working session <p>Team Meetings:</p> <ul style="list-style-type: none"> Teams meet with faculty leads, also direct discipline specific questions to other faculty 	

	<p>Team Meetings:</p> <ul style="list-style-type: none"> Meet by discipline, splitting up student teams. Team members with engineering questions/interest meet with engineering prof. Team members with design questions/interests meet with design prof. Team members with business questions/interests meet with business prof. 		
Week 12	Tuesday Mar 29	Thursday Mar 31	
	<p>Assignments Due:</p> <ul style="list-style-type: none"> Updated conceptualization work and testing <p>In Class:</p> <ul style="list-style-type: none"> Studio Working session 	<p>Assignments Due:</p> <ul style="list-style-type: none"> Draft presentation of Phase 3 <p>In Class</p> <ul style="list-style-type: none"> Studio Working session <p>Team Meetings:</p> <ul style="list-style-type: none"> Teams meet with faculty leads 	
Week 13	Tuesday Apr 5	Thursday Apr 7	Friday Apr 8
	<p>Phase III Presentations, 20 minutes followed by Q&A</p> <ul style="list-style-type: none"> 10:35-11:35, Emirates 11:40-12:10, lunch 12:15-1:15, Thermo King 	<p>Phase III Presentations, 20 minutes followed by Q&A</p> <ul style="list-style-type: none"> 10:35-11:35, Rawlings 11:40-12:10, lunch 12:15-1:15, Ball 	<p>Phase III Presentations, 20 minutes followed by Q&A.</p> <ul style="list-style-type: none"> 9:30-10:30, Volvo 11:00-12:00, Opus Mach 1:15-2:40, J&J (both teams)
	Tuesday Apr 12	Thursday Apr 14	
Realizing the Opportunity	<p>Assignments Due:</p> <ul style="list-style-type: none"> Read Chapter 5 <p>In Class:</p> <ul style="list-style-type: none"> Phase IV expectations and Deliverables Business Plan / Product Plan discussion Working session <ul style="list-style-type: none"> Concept refinement & development Planning next level user feedback on concept <p>Team Meetings:</p> <ul style="list-style-type: none"> Emirates, Thermo King, Rawlings, and Ball teams meet with all 3 faculty members 	<p>Assignments Due:</p> <ul style="list-style-type: none"> Updated refinement and development work and feedback <p>In Class:</p> <ul style="list-style-type: none"> Studio Working Session <p>Team Meetings:</p> <ul style="list-style-type: none"> Opus Mach, Volvo, and both J&J teams meet with all 3 faculty members 	
Week 15	Tuesday Apr 19	Thursday Apr 21	
	<p>Assignments Due:</p> <ul style="list-style-type: none"> Updated refinement and development work and feedback <p>In Class:</p> <ul style="list-style-type: none"> Studio working session <p>Team Meetings:</p> <ul style="list-style-type: none"> Individual Jarden teams meet with all 3 faculty 	<p>Assignments Due:</p> <ul style="list-style-type: none"> Early draft/outline of final presentation and report <p>In Class:</p> <ul style="list-style-type: none"> Studio working session <p>Team Meetings:</p> <ul style="list-style-type: none"> Individual Opus Mach, Volvo and Institute 	

	members	teams meet with all 3 faculty members
Week 16	Tuesday Apr 26	Thursday Apr 28
	<p>Assignments Due: Final report due today by 1:30 for all teams (posted)</p> <p>In Class:</p> <ul style="list-style-type: none"> • Studio working session <p>Team Meetings:</p> <ul style="list-style-type: none"> • Individual Jarden teams meet with all 3 faculty members 	<p>Assignments Due:</p> <ul style="list-style-type: none"> • Updated refinement and development work and feedback <p>In Class:</p> <ul style="list-style-type: none"> • Studio working session <p>Team Meetings:</p> <ul style="list-style-type: none"> • Individual Opus Mach, Volvo and Institute teams meet with all 3 faculty members
Week 17	Monday May 2 AND Tuesday May 3	Wed and Thursday May 4 and May 5
Finals Week	<ul style="list-style-type: none"> ▪ Practice presentations will be held both Monday and Tuesday this week. Please hold these dates in your calendars. <p>Tuesday May 3rd Revised Final Reports Due: 12:00 PM (posted); provisional patent application cover sheet due</p>	<p>IPD Final Presentations ALL DAY!</p> <p>Due: 25 minutes for presentations, including video material. Q&A follows the presentation.</p> <p>Location Integrated Innovation Institute, w/ company and Institute representatives</p> <p>Details of the day will be provided closer to the presentation date. There will be presentations in the morning and afternoon. Lunch will be provided and a reception will follow.</p> <p>On the day of your presentation you are required to attend all the presentations for that same day. Attendance on the other Phase IV Presentation day are optional.</p>