

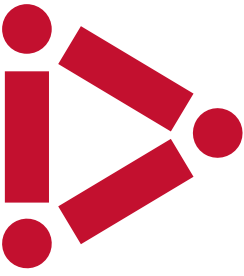
Integrated Innovation Institute Sample Course Descriptions

This document is a highlevel overview of curriculum at the Integrated Innovation Institute and includes previous course descriptions per degree as well as courses shared across the Pittsburgh & Silicon Valley campuses. It is designed to complement the degree specific course plans. The course plan will note which courses are required or electives for each degree.

Semester-specific course descriptions will be released in advance of graduate student registration each semester.

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Master of Integrated Innovation for Products & Services

Pittsburgh Campus

Fall

49-700, Engineering Design Fundamentals – 6 units

Engineering Design Fundamentals will teach the basic principles and philosophies of engineering design (with emphasis on mechanical engineering). Topics include stress analysis and fracture, heat transfer, kinematics, and systems packaging. Students will learn the issues engineers must consider during design of commonly produced products. Class includes lectures and labs.

49-701, Industrial Design Fundamentals – 6 units

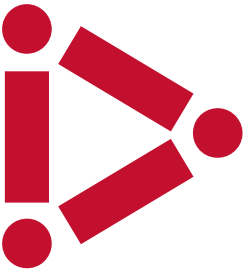
Industrial Design Fundamentals introduces non-design students of the MII-PS program to the placement of products in the marketplace. Through lectures, discussions and assignments students will gain an understanding of the evolution of products in preparation to conceive of products in the IPD Capstone course.

49-702, Business Fundamentals – 6 units

Business Fundamentals will introduce basic business management concepts and provide the motivations to make these topics more relevant as they appear in later more advanced classes. We will cover six basic functional business areas: accounting, finance, marketing, operations, strategy, and managing technology & innovation. In addition to covering theory and applications, the course will use a business simulation to help students to understand how the functional areas tie together.

49-703, Career Planning for Integrated Innovators – 6 units

This highly interactive class will work to assist students in uncovering abilities and identifying goals towards a career in product design/development. It will also look at ways to communicate the unique values MIIPS students have and align them with employer expectations. Students will then integrate those things into a career search plan. The class will alternate between lecture/presentations and coaching by experts and students presenting materials for practice and critique during class sessions.



49-704, Integrated Innovation Seminar & Workshop Series – 0 units

The Integrated Innovation Seminar & Workshop Series meets multiple times throughout the fall and spring semester. Seminars will focus on intellectual content from industry leaders in innovation and product development. Workshops will focus on skill building in key areas for integrated innovators. This course is a requirement of the Master of Integrated Innovation for Products & Services degree. The seminar & workshop schedule for each semester will be released on the first day of classes.

49-710, Visual Processes – 6 units

Students in this course will learn about a variety of different ways we leverage visual communication techniques and approaches to communicate. We will cover the following:

- Industrial Design Sketching
- Information visualization & dashboards
- Graphic User interface design
- Executive Summary and Pitch Decks
- Visual Brand Language, Templates and Styling
- Visual Explanations
- Storyboarding and making simple videos

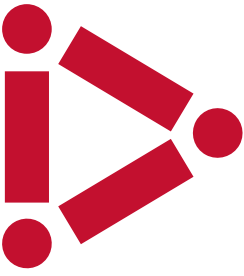
Guests from industry will join us with stories from their work each week, and weekly homework assignments will allow students to demonstrate their understanding of the technique and its application.

49-712 User Research Methods – 6 units

User Research Methods will teach the basic methods of user research, including one-on-one interviewing and ethnographic techniques. The course will cover research planning, field research, and the analysis of research findings. Although the course will focus on qualitative and primary research, the benefits of quantitative and secondary research will also be addressed. The course includes lectures and discussions, along with readings and research assignments.

49-714, Programming for Online Prototypes – 6 units

An introduction to rapidly prototyping web-based products and services. This 7-week experience will teach students the basics of web development for online



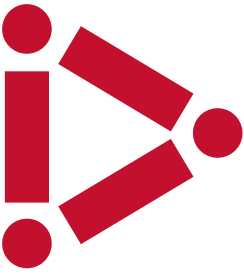
services. Specifically, we'll focus on lightweight, minimal UI, microservices (e.g. bots, conversational interfaces, platform integrations, designing micro-interactions, etc.) We'll introduce and examine these new web service trends and interactive experiences. Students will learn through instructor led workshops and hands-on experimentation. As an intro level course, no knowledge of programming is needed. By the end of the course, students will be able to design, prototype and deploy their own web-delivered services.

49-715, Special Topics: IoT Ecosystems – 6 units

IoT Ecosystems: Designing Intelligent, Interactive, Internet-enabled Spaces. Imagine a room with dozens of internet-enabled objects sensing, sharing and cooperating around data. It gets complex really fast. So how do we design ecologies of interacting objects that actually do useful things? We'll get hands-on with this question as part of this design-build course Over 7-weeks, we'll collaboratively research, design and realize a interactive ecosystem of networked devices that solves a stakeholder-driven problem. We'll explore the opportunities to deliver rich, adaptive and connected experiences through existing internet of things products as well as new and emerging technologies. Students will be supported in this in this exploration by lectures, readings, design exercises, and guest speakers that introduce foundational theory, strategies, and precedents that inform the design of these complex ecologies.

49-716, Special Topics: Experience Innovation – 6 units

Experience innovators create new offerings for businesses with a primary focus on the quality of the human experience rather than the material of that experience. This leads us to blur boundaries between traditional design fields and create holistic offerings. In this course students will work in small project teams on short design sprints to analyze leading designed experiences and create new ones. Service and experience design frameworks will be used both to analyze current offerings as well as to propose an innovative new experience. Students will be working in familiar and unfamiliar forms including concepts for products, documents, events, spaces, activities, scripts, and software. By the end of this course, students should be able to: Easily distinguish and shift between different perspectives on the same design problem space Leverage Service and Experience design frameworks to explain how an offering unfolds for people Speak articulately about offerings that are made up of systems of products, services and other components.



49-730, Designing for Manufacturing and Sustainable Design – 6 units

Design for manufacturing and environment looks at the influences of materials, manufacturing, downstream processes and the impact on the environment in the overall design of a product and its impact on successful innovation. Downstream influences that will be explored include: material selection, manufacturing processes, assembly, robustness and quality, platform design, product costing, environmental considerations and approaches.

49-740, Integrated Product Development Methods – 6 units

This course is an introduction to the Integrated Product Development (IPD) methods and the curriculum in the MII-PS program. This mini will cover methods for the first three phases of the IPD method: Identifying opportunities for new products and services; understanding those opportunities including stakeholder research and product value propositions, as well as competitive analysis; and conceptualizing opportunity solutions that meet the value proposition. This course will combine lecture, project and team skills.

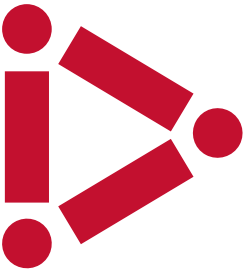
49-747, Integrated Innovation Institute Masters Essay – 12 units

This course is required in the final fall semester of the MII-PS Advanced Study degree. The masters essay will 1) assimilate the teachings of the program and the summer internship, 2) allow the student to put the context of the program in perspective with respect to the literature, 3) expose applications or extensions of the program teachings in the context of an application or field of study. A written masters essay and public presentation will be required.

Spring

49-704, Integrated Innovation Seminar & Workshop Series – 0 units

The Integrated Innovation Seminar & Workshop Series meets multiple times throughout the fall and spring semester. Seminars will focus on intellectual content from industry leaders in innovation and product development. Workshops will focus on skill building in key areas for integrated innovators. This course is a requirement of the Master of Integrated Innovation for Products & Services degree. The seminar & workshop schedule for each semester will be released on the first day of classes.



49-713, Designing for the Internet of Things – 6 units

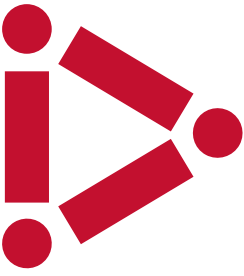
Thermostats, locks, power sockets, and lights are all being imbued with “smarts” making them increasingly aware and responsive to their environment and users. This course will chart the emergence of the now connected world to explore the possibilities for future products and connected spaces. This introductory, hands-on course invites students to creating connected products without any knowledge of programming, electronics or systems. Students will be introduced to interactive connected technologies through a series of hands on exercises, collaborative projects, in depth discussions, and instructor led tutorials. Topics explored will include awareness, real time sensing and communication, embedded intelligence, and designing experiences for the internet of things. By the end of this course, students will be familiar with the core skills, the considerations involved and design process required to build a connected system. Students will also apply this learning in collaborative groups to realize a prototype-connected product.

49-717, Special Topics: Digital Ethnography – 6 units

Students will study the basic principles of ethnography and then conduct a 6-week project as a participant observer in a digital setting. This course provides an opportunity to hone and refine skills from the User Research Methods course, and dive deeper into one method. You will plan the research, collect data, analyze and synthesize what was learned and present a research report that identifies not only what was observed but also interpret its meaning and make indications about opportunities to innovate with new offerings. Research topics will be provided, however you may propose a topic. Priority enrollment to III graduate students; students outside the III can register with the permission of the instructor.

49-719, Internet of Things – In Depth – 6 units

Building on Designing for the Internet of Things, this elective will guide students in the development of a single IoT concept in greater depth. Before the course, students will propose a project they would like to focus on for seven weeks. Then, students will rapidly iterate through the lifecycle of developing a single project. They'll explore the implementation of their product in detail from technology to user experience. Regular guest talks from industry leaders will provide insight into developing market-ready, robust IoT products. Finally, students will engage in weekly critique and work sessions where they can seek



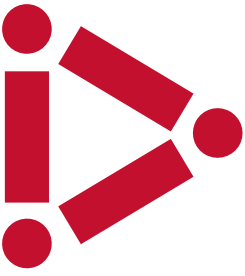
instructor support in transforming their concept into tangible product. By the end of the course, students will have realized a refined prototype, along with a proposal for bringing their product to market.

49-720, Product & Brand Management – 6 units

Product and Brand Management is an introductory mini-course designed for MIIPS students who are interested in exploring the concepts, roles and responsibilities associated with both product management and brand management. Through interactive lecture, case discussions, and assignments, you will use a host of planning, development and marketing tools that product and brand managers use. These tools will help you address common strategic, as well as tactical, challenges. You will address such challenges across the product lifecycle to make a product or service successful. And, you will learn how product and brand management compare in industries served, and in career paths. The course will have an emphasis on product management and B2B products, but will also address aspects of brand management and B2C products. Further, the course will build on your knowledge of marketing, engineering, accounting, and manufacturing, showing how product managers and brand managers work cross-functionally and play critical leadership functions to make products and services successful.

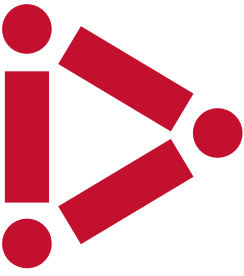
49-732, Special Topics: Medical Device Innovation – 6 units

The increasing pace of medical discoveries and emerging technologies presents a unique and exciting time for medical devices. Medical devices range from biomaterials that stimulate the body to repair itself to drug eluting stents to robotic surgical systems. Because they seek to improve and prolong human health, there are unique requirements and challenges for medical device development compared to most other industries. This class will look at how medical device innovation is currently practiced as well as the drivers which govern it, such as the FDA, intellectual property, reimbursement, and funding. By the end of this course, students should be able to: (1) obtain a broad understanding of medical devices; (2) identify new product opportunities; (3) understand the drivers that affect medical device development; and (4) develop strategies to address those drivers within the overall medical device development plan.



49-741, Integrated Product Development Capstone – 12 units

The IPD course focuses on team-based integrated product development among engineering, business, and design disciplines. The semester course consists of four modules including identifying, understanding, conceptualizing and introducing a product opportunity. Interdisciplinary teams of students in engineering, business, and industrial design learn methods to research the needs, wants and desires of a market opportunity, define product specifications, conceptualize products to meet the users' needs and desires and refine the most promising concept. The result is a resolved form, functional design, and marketing plan. The course also focuses on communication of the project through multiple presentations and reports.



Master of Science for Software Management

Silicon Valley Campus

Fall

49-750, Software Product Definition – 12 units

Students develop and refine a compelling and realistic vision for a new product. They learn to understand user and customer needs, to document those needs, and to envision creative solutions.

After completing this course, students will be able to:

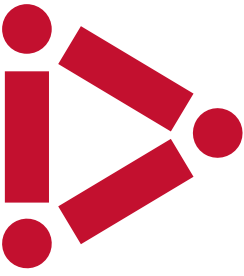
- Use contextual inquiry and work modeling techniques, including interviewing, to understand problems faced by individuals and organizations
- Define and apply personas, goals, and scenarios to envision a high quality user experience in a new system
- Define the 'whole product' required to provide a complete solution, systematically, from a customer's point of view
- Define a business vision that explains how product development will contribute to achieving the goals of the customers and end user

49-751, Requirements Analysis – 12 units

Project teams analyze, document, and plan the management of functional, technical, and business requirements for a software system and then create a product release strategy.

After completing this course, students will be able to:

- Derive key functional, data, technical, and business requirements from scenarios
- Analyze and document functional and nonfunctional requirements for a software system
- Identify risks inherent in potential solutions
- Estimate market size and to evaluate competitive products and services
- Formulate the features for a minimum viable product and a road map for subsequent release
- Present analyses and plans to a management audience



49-752, Product Definition and Validation - 12 units

Students learn techniques for envisioning creative solutions to real problems. They develop and refine a compelling and realistic vision for a new product. They practice techniques to understand and validate user and customer needs, and to identify market opportunities. They analyze, document, and plan the management of functional, technical, and business requirements for a software system and then develop a product release strategy.

49-760, Foundations of Software Management - 12 units

Students apply fundamental methods, models, and frameworks to assess real software companies from a variety of perspectives - marketing, strategy, finance, operations - to understand how businesses organize and make decisions. Working individually and in groups, students develop skills for managing teams and employee performance. Students practice personal leadership.

After completing this course students will be able to:

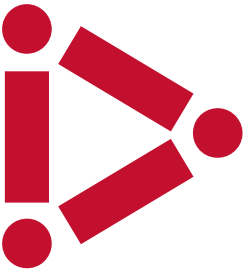
- Use contextual inquiry to understand user 'pain' and establish product goals
- Use the Goal-Question-Metric technique to establish strategic measures
- Characterize a software business in terms of markets and products
- Read and understand basic financial statements
- Assess a company's strategy in light of competitors, market and macro factors
- Make a presentation to an executive audience

49-761, Elements of Software Management - 12 units

Through seminar discussions and individual investigation, students assess real software businesses from marketing, business strategy, financial, and overall business perspectives, applying fundamental methods, models, and frameworks.

After completing this course students will be able to:

- Characterize a software business in terms of markets and products
- Understand basic financial statements
- Assess a company's strategy in light of competitors, market and macro factors
- Make a presentation to an executive audience



49-770, Metrics for Software Managers - 12 units

As members of a project team, students analyze and propose metrics initiatives for a fictional software organization with specific software management problems, aligning the initiatives with business and stakeholder goals.

After completing this course students will be able to:

- Define a metrics program at the software project level
- Define a metrics program for a product portfolio

49-774, Product Management - 12 units

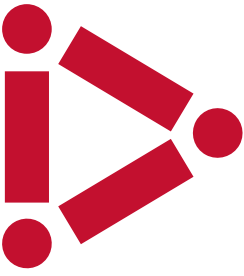
While Product Manager has been a key role in the high-tech industry for over 10 years, the Product Management training in this space was relatively limited. This course connects the knowledge and skills students learned from previous Software Management courses, and guides students to leverage this learning to position, design, develop, launch, measure, and grow products, particularly in the internet/software sectors. The course covers a product managers' role and the application of product ideation & positioning, feature design and documentation, product development process, go-to-market, measurement/optimization, and growth.

49-775, The First-Time Manager - 12 units

This course is intended for experienced software developers who have newly been given management responsibilities. The course addresses management styles, managing people (reviewing, mentoring, hiring, firing), managing teams (task assignments, collaboration, conflict resolution), managing schedules and deliverables, reporting to higher management, working with other groups in the organization, and communicating with clients and partners outside the organization.

49-780, Human Computer Interaction & User Experience - 12 units

This graduate level short course exposes Software Engineering and Management professionals to the field of Human Computer Interaction (HCI) and User Experience (UX). In the modern marketplace, the winners are those who enable real people to harness the power of technology innovations in delightful ways. Delighting customers through technology requires a strong foundation in HCI and a focus on UX. This course is primarily for those who come from a technical



or business background but are interested in gaining relevant knowledge and basic skills in HCI/UX in an interactive, fast-paced, and engaging format.

The goals for the course are:

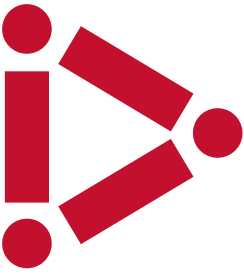
- To provide an overview across the breadth of HCI/UX disciplines to understand the relevant roles, responsibilities, processes, methodologies, concepts, tools, and deliverables expected of them.
- Through increased knowledge and understanding, establish empathy with HCI/UX practitioners in order to establish productive working relationships.
- To provide a theoretical & practical foundation for the HCI & UX practice within modern product development.
 - Understand the underlying history & theory through relevant readings, discussions, and presentations.
 - Gain practical experience through team-based project work, presentations, and critique.
 - Work together in cross-functional teams using a User-Centered Design (UCD) approach.
- To create a greater appreciation for the intellectual, emotional, and practical value of HCI & UX.

49-786, Software Engineering Management - 12 units

In this course, you will learn the software engineering paradigms that are widely adopted in modern software industry. You will be introduced to the Software Development Life Cycles (SDLC) and its supporting process and tools in each stage. Through team based projects, you will gain firsthand experience on best practices in the art of collaboration and software engineering management. In a high-performing team environment, you will be able to build cloud based mobile applications through iterative process of requirements definition, architecture design, implementation, integration, testing, measurement and deployment. If you have already taken 18-652, Foundations in Software Engineering, you are not eligible to register for this course.

49-787, Architecture & Programming Principles - 12 units

This course teaches how to build an architecture that stands the test of time and business, how to keep your code manageable and clean, how to ensure longevity of your design, and how to build interoperable systems. You will do hands-on



individual design and coding exercises addressing architectural concepts like scalability, reliability and security, development essentials like reusable code, refactoring and technical debt, and current technologies like containers, APIs and data pipelines. Examples and exercises will be provided in Java, but you can write quizzes and assignments in any equivalent major programming language with instructor approval.

Spring

49- 762, Software Product Strategy – 12 units

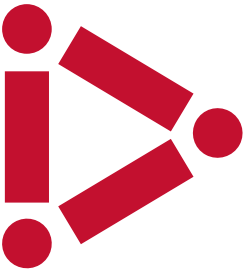
Students analyze market opportunities for a software product, evaluate its technical feasibility, then expand the product definition and create a product roadmap. Prerequisites: Admission to the Silicon Valley Software Management program and Requirements Analysis (49751).

49-763, The Business of Software – 12 units

The Business of Software course is focused on the processes and the economics of bringing software products and services to market, with an emphasis on partnership and sales strategies. The previous course, Software Product Strategy (SPS), addressed the technical feasibility of implementing the product and the marketing strategy. BSW picks up where SPS leaves off, starting with teams creating a partnership plan and a sales strategy for their products. The final step involves the creation of budgets and revenue models for the proposed product as a way to determine the viability and business opportunity for the envisioned product. The course concludes with student presentations that recommend for or against continuing with product development.

49-771, Process and Project Management – 12 units

Students define the optimal software development method for a given project, by identifying a set of Agile, Lean and/or disciplined practices suited for the project's specific needs. They also develop project's estimates and multilevel plans based on their recommended method. Prerequisites: Foundations of Software Engineering (18652) or Metrics for Software Managers (49770) or consent of instructor.



49-780, Human Computer Interaction & User Experience - 12 units

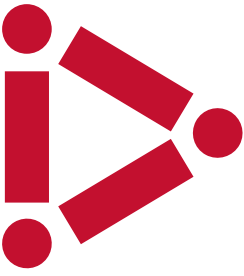
This graduate level short course exposes Software Engineering and Management professionals to the field of Human Computer Interaction (HCI) and User Experience (UX). In the modern marketplace, the winners are those who enable real people to harness the power of technology innovations in delightful ways. Delighting customers through technology requires a strong foundation in HCI and a focus on UX. This course is primarily for those who come from a technical or business background but are interested in gaining relevant knowledge and basic skills in HCI/UX in an interactive, fast-paced, and engaging format.

The goals for the course are:

- To provide an overview across the breadth of HCI/UX disciplines to understand the relevant roles, responsibilities, processes, methodologies, concepts, tools, and deliverables expected of them.
- Through increased knowledge and understanding, establish empathy with HCI/UX practitioners in order to establish productive working relationships.
- To provide a theoretical & practical foundation for the HCI & UX practice within modern product development.
- Understand the underlying history & theory through relevant readings, discussions, and presentations.
- Gain practical experience through team-based project work, presentations, and critique.
- Work together in cross-functional teams using a User-Centered Design (UCD) approach.
- To create a greater appreciation for the intellectual, emotional, and practical value of HCI & UX.

49-781, Data Analytics – 12 units

The landscape of software products has changed over the last decade with the advent of data science as an interdisciplinary field, and its broad and deep applicability has created opportunities for delivering interesting and innovative capabilities based on deep understanding of data. This course helps current and future product managers understand the distinction between data-driven and conventional products and learn to identify new product capabilities made possible by quantitative data analysis and modeling. Regular hands-on exercises will expose them to techniques for analyzing data, developing insights, building models, and turning the outcomes from models into end-user value. The course



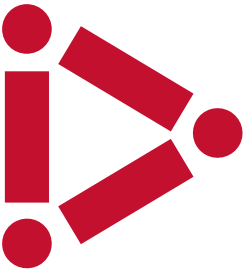
project will require students to go through the life cycle of a data-product and showcase their insight as a product feature.

49-788, Mobile Apps for the Internet of Things – 12 units

This course provides an overview of Internet of Things (IoT), especially focusing on software layer of building mobile applications to capture and process data generated by IoT devices and providing analytical insights. Students will access health and fitness information, motion data, explore home automation technologies and beyond. Through this course, students will understand and appreciate why information technology is entering the era of digital transformation from pure Internet to IoT.

49-807, Exponential Innovation – 12 units

This semester course explores the new paradigms of innovation and competitiveness. This disruption is happening because technologies such as computing, sensors, artificial intelligence, and 3D printing are advancing exponentially and converging. For more than 100 years, the processing power of computers has doubled every 18 months. Now it has come to the point where our smartphones are more powerful than yesterday's supercomputers were. Faster computers are now being used to design faster computers; and computers and the information technology that they enable are absorbing other fields. In order to thrive in today's era of exponentially advancing technologies, students will need to understand the pace of change and learn to take advantage of the upheaval it will bring. Innovation has globalized; business models and technology developed in one country can easily be exported to another there are massive opportunities for small groups of people to create an outsized positive impact on the world. This class teaches students how to watch for convergence and disruption and to think like the startups that are building the future of nearly every industry. The class combines lectures, discussions, group activities, and guest speakers to teach students this exciting rapid change to technology.



Summer 2019

49-766, Agile Marketing for High Tech Innovation – 12 units

Agile Marketing for High-Tech Innovations will cover how to formulate marketing strategies that lead to successful products. It will include how marketing strategies are adapted for high tech innovations and products including addressing strategic market planning, functional expectations and tactical considerations when using marketing tools. Topics include: strategic market planning, market orientation, types of alliances needed for moving from innovation to product acceptance, understanding high-tech customers, product distribution options, technology/product management considerations for marketing effectively, pricing, marketing communications, breakthrough versus incremental innovation marketing and measuring marketing effectiveness.

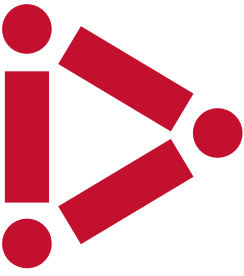
49-767, Organizational Behavior for High Tech Knowledge Industry – 12 units

Using innovative conceptual frameworks, students learn the fundamentals of organizational behavior as it relates to the unique challenges of high tech enterprises, concluding with a team project focused on a specific organizational problem for a selected company.

49-768, Special Topics: Finance for Entrepreneurial Ventures – 12 units

The course seeks to blend finance and economics to help entrepreneurs to understand the relationship between venture finance and evaluation of business risk. It starts with a workshop on the accounting tools that are necessary for entrepreneurs to make a business case for their software start-ups. In the process students will acquire a range of business understanding and skills necessary to build a new company and plan for equity participation for founders, employees, and venture capitalists. The workshop on accounting fundamentals, is followed by some introductory finance, and then students work through the process of converting operating, human resource, capital, and marketing plans into a set of financial projections that enables a start-up to be valued and funded. Students will learn:

- How early stage startups reduce uncertainty about the viability of their ventures by experimentation, planning, and decide under what conditions scaling early may be beneficial;
- Understand the sources of finance for entrepreneurial activity and their role in maximizing gain while controlling personal risk;



- How to put together a financial plan and pitch for their Start-Up in a professional manner.

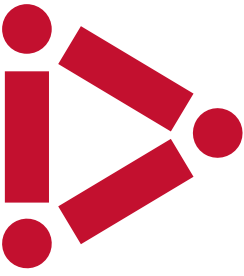
49-782, Open Source Software – 12 units

This elective is designed to yield student proficiency regarding contemporary thinking and fundamental skills regarding Open Source Software. Emphasis is on understanding the impact of open source software on the software industry, including licensing and commercialization issues, corporate software evaluation techniques, and business models. Students install and use open source software (Linux, OpenOffice, Firefox, etc.) and work in teams in a problem-based seminar/workshop format. Team projects focus on creating evaluation criteria for specific categories of software, followed by evaluating open source software components according to the Business Readiness Rating framework. Team projects will be supplemented by recommended readings and presentations by invited outside speakers.

49-783, Introduction to Cloud Computing – 12 units

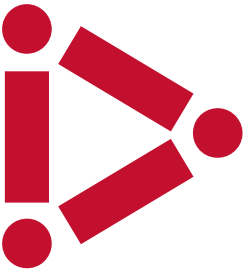
This class is designed to familiarize you with the state of the art in cloud computing and big data analysis. This course is suitable for both students on a technical track (engineering, science) as well as those on a management track who are passionate about big data powered products. You will study basic types of clouds, widely-used cloud computing systems and their strength and weakness, core concepts and technologies on distributed data storage, distributed processes and services, security practices, popular Big Data Analysis algorithms and machine learning use cases on cloud. You will acquire deeper understanding via both case studies from industry big players as well as a project-based hands-on application build and deployment on cloud (no technical pre-requisite). After completing the course students will be able to:

- Build a basic product on two well-known cloud systems
- Make architectural decisions on choosing the right cloud type, core technologies and services
- Make business decisions on cloud vendors and the right level of investment on cloud
- Critique some current industry cloud-based solutions



49-789, Special Topics: Architecture Principles for Product Managers - 12 units

Software products are becoming increasingly large and complex, and the responsibility of Software Product Managers has extended beyond core product functionality into non-functional aspects like cloud platform selection, scale and reliability decisions, interoperability with other products, and future extensibility considerations. For this, they rely heavily on their development team to architect and design products that are reliable, scalable, flexible, cost-effective and "future-proof." They are surprised when the product fails to meet these expectations - discovered only when the rubber meets the road - often too late to make any fundamental changes. These failures may manifest themselves in the inability of a product to scale the next million users, to integrate with other software systems, to support an international user base or to be sold through channels. This course aims to get product managers technically savvy about the non-functional aspects of a software system, and enable them to be influential in the architectural and design phase of product development. It will review a variety of architectures archetypes and analyze them for relevance to specific business requirements. It will also review some well-known products and explore their architectural characteristics. As part of the course, students will conceptually architect a product and debate its pros and cons. This course is designed for students who have some experience with product management and can relate to the challenges addressed in it. No experience with coding is necessary.



Master of Science for Technology Ventures

Silicon Valley Campus

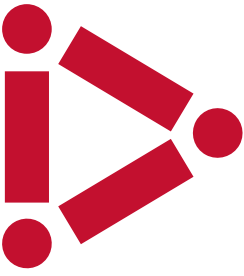
Fall

49-853, Product Management – 6 units

The course covers a product managers role in the application of product ideation and positioning, feature design and documentation, product development process, go-to-market, measurement/optimization, and growth. The course begins with a brief overview of the product management role, and then goes step by step into managing the process of building a product. In each class, students are required to discuss the reading materials, participate in the discussion sessions, and dive into in-class practices. The course will explore the Product Managers role and responsibilities across the product life cycle; techniques to understand and validate customer needs and product success; application of the knowledge and skills needed to research, position, design, develop, launch, optimize, and grow products; new product development and delivery methodologies and their impact on product and customer; and the key attributes of a successful Product Manager (PM) through direct dialogue with Silicon Valley PMs.

49-855, Venture Governance, 6 units

The goal of the course is to teach founders of a high-tech startup venture the requirements and process to be a director and how to manage their Board of Directors and Advisory Boards. The boardroom is where the governance of the venture occurs. The course will propose frameworks for understanding the complex dynamics among directors, executives, investors and shareholders. The key elements of the work boards do includes: strategic reviews, selecting, evaluating and compensating CEOs and other senior executives, company re-organizations, new director selection, managing top executive succession and dealing with various corporate crises. The role of the Boards is crucial in the value creation phase of a technology ventures trajectory. Conceptual frameworks will be taught to effectively manage this crucial aspect of a ventures governance in real time. This course will cover the following topics: board participation and voting rights, Board of Directors responsibilities and liabilities, advisory board mentoring duties and shareholding vesting, managing Board of Directors,



Directors and Officers Insurance and Compensation of Board Members, Board of Directors role during venture scaling, fundraising, firing hiring CEOs and company officers, board members role during the Merger and Acquisitions transaction and during IPOs, and joining other boards.

49-856, Legal Issues in New Venture Creation, 6 units

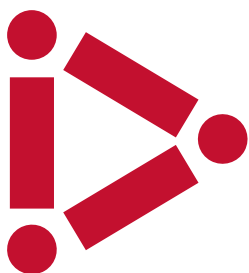
A critical part of creating a new venture is to provide the legal structure for both compliance and to prepare the venture for future success. For start-ups the legal profile of the company sets up the framework for growth. The course will cover basic legal requirements of incorporation, and additional options that need to be determined by the founders including equity distribution, board structure, employee stock option vesting, triggers for contingencies such as firing or acquisition and other issues. Another critical legal issue for both startups and established enterprises surrounds protecting intellectual property to immunize the company's strategic advantage as it gains velocity in the global market and encounters competition. Students will learn about various Intellectual Property tools and strategies to protect their product innovations and to understand the competitive marketplace, both in the US and globally.

Spring

Pittsburgh Campus

49-850, Grand Challenge Innovation – 12 units

This course presents a formal process for innovation. The method is applied to solve hard societal problems. Innovators and entrepreneurs have an opportunity to solve very hard problems required in the twenty first century. This course teaches students how to apply emerging technologies to solve grand challenges through a physical system. Students will learn to identify the grand challenge as an opportunity for new products, understand that opportunity and requirements for a successful solution, conceptualization of product solutions based on those requirements, and proof of concept. Priority will be given to students in the Master of Science in Technology Ventures degree.



Silicon Valley Campus

49851, Financial Fundamentals for New Ventures – 6 units

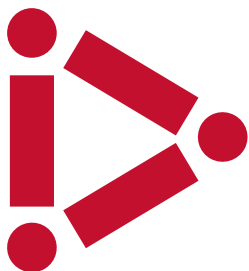
This course will aid high tech teams in their financing decisions for startup considerations and entrepreneurial management. The course will review the basics of financials such as the balance sheet, the P&L and a cash flow statement. It will then address the creation of pro forma financials to support financing for new business ventures. This will include the development of business management understanding, the relationship between venture finance and business risk evaluation, and the process of valuing of the opportunity. Teams will create a venture pitch for their startup.

49-852, Agile Marketing for New Ventures – 6 units

This course will cover how to formulate marketing strategies that lead to successful products. It will include how marketing strategies are adapted for high tech innovations and products including addressing strategic market planning, functional expectations and tactical considerations. Topics include: strategic market planning, positioning, types of alliances needed for moving from innovation to product acceptance, breakthrough versus incremental innovation marketing, and measuring marketing effectiveness.

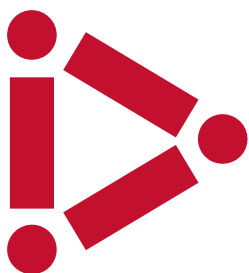
49-857, Dynamic Global Teams – 6 units

Dynamic teamwork and collaboration is a critical success factor and a major source of competitive advantage and frustration for companies worldwide. Many startups have engineering teams based in low cost parts of the world. Established companies have disturbed teams working in R&D and Engineering in different geographies. Mobile and remote communication technologies have transformed the global business landscape. Super-flexible teams drive and execute entrepreneurship and innovation. This course will focus on profiles of dynamic collaborative teams, what it takes to balance different priorities, create trust and alignment, interact with diverse stakeholders, and perform under time pressures and resource constraints, all under complex, fast-moving and unpredictable global markets. This course will study critical success factors in driving innovation and explore how super-flexibility enables rapid, real time adaptation. The course will describe practical action steps for organizing and managing super-flexible teams, study and apply fundamental findings in cognitive psychology that support adaptability and creativity of teams, introduce



methods for training cross-functional teams to excel at innovation, and learn how to use practical tools and techniques that can turn ideas into action.





Shared Courses Across Degrees

Some available via Distance Learning.

Please check the degree course plan to see how these courses are part of each specific degree.

49-733, Designing Smart Systems – 6 units

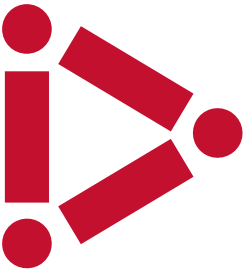
Driven by the combination of increased access to data, computational power, and improved algorithms, data science and artificial intelligence technologies have become mainstream. These technologies include machine learning, natural language and speech processing, expert systems, robotics, and vision. Historically, early programs applying these capabilities were designed to operate on their own, on very narrow tasks, based on pre-programmed knowledge. Today, we have the ability to design human-computer systems in which both human and computers act intelligently, adapt to the world and learn from experience, improving their performance over time. How do we design such collaborative systems, taking advantage of the fundamentally different ways in which humans and computers act and learn? How do we build smart systems that achieve their intended goals, with a minimum of unintended side effects? The mini-course will give students the opportunity to address such questions. After an introduction of some basic concepts and techniques in AI and data science (only a basic familiarity with statistics is assumed), the course illustrates both the potential and current limitations of these techniques with examples from a variety of applications. We spend some time on understanding the strengths and weaknesses of human decision-making and learning, specifically in combination with AI systems. Exercises will include close examination of the inputs and outputs of various technologies with the goal of learning to select appropriate technologies for a given problem and anticipate design implications. Each student will also complete a final project that takes a project from start to finish (framing the problem, choosing data sources, exploratory data analysis, basic modeling, communicating results).

49-800, Commercializing Intellectual Property – 12 units

Only offered in Silicon valley starting in Fall 2018

The course focuses on the innovation of products based on emerging technologies that are ready for technology transfer, but have not moved past the “research lab”. The course will follow a rigorous product innovation process that





begins with identifying opportunities for products using these technologies, understanding the needs of the potential customer and other stakeholders, and developing concepts that illustrate the potential product. The course will include understanding new technologies, extensive customer research, product innovation methods, and initial business execution planning that includes market definition and execution planning. The results of this course may follow into 96-809, Enterprise Innovation, in the spring term, to further develop the concept and execution plan into a viable market opportunity. For this year, technologies will be based on CMU research ready for tech transfer.

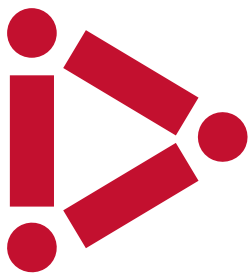
49-802, Innovation & Entrepreneurship – 12 units

This course focuses on entrepreneurship and innovation from the vantage point of high-tech companies in Silicon Valley. We will explore these topics in the context of the Creation Phase - focusing on founding a new start-up and raising seed funding; and the Scaling Phase - focusing on growing a venture where startups typically undergo B, and C rounds of funding; We will examine common mistakes and misconceptions in starting a new entrepreneurial business, and meet entrepreneurs, angel investors, and venture capitalists from Silicon Valley to learn, first hand, the challenges of conceiving, creating, and growing a new venture.

In the second part of the IE course, our focus will be on the Consolidation Phase, when growing ventures evolve into established global corporations We will examine critical pain points facing this group of companies, the impact of organizational complexity, the challenge of managing a multi-business enterprise, and expanding the global footprint. This is the phase when technology companies find it more challenging to innovate and often shift their growth focus to searching for acquisitions. Invited guests will share their experiences and lessons learned, and give us a first-hand perspective on realities facing this critical group of innovative companies.

49-808, ST: Integrated Innovation for Large-Scale Problems – 12 units

This course focuses on team-based innovation across design, business, engineering and software with the potential for large-scale impact. Students working across geographic locations will take on a complex problem in an emerging field, and methodically come up with unexpected ideas and opportunities to tackle and solve it. The semester will consist of a series of four



modules where students will research current signals and market indicators; identify opportunities for innovation; and formulate, prototype, integrate and resolve a solution. Students will work both individually and collaboratively and will learn and apply innovation, entrepreneurship and conceptualization skills in scaling existing products and services into new markets and in evolving new products in existing markets. Students will be supported in this exploration by regular guest talks from leading academics and industry professions who will provide their insights and guidance on developing solutions for complex problems.

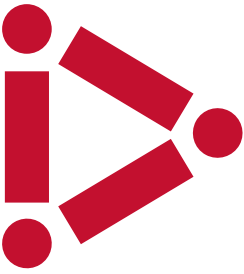
49-854, Business Models and Strategy – 6 units

This course is about the development of executable strategies for entrepreneurial efforts. In order for entrepreneurs to be successful, the ability to create a business model and roadmap for execution is essential. Strategy is about making decisions and having alternatives for courses of actions. This course will focus on effective approaches and measures in order to make things happen under tight time and financial considerations. The course will explore how to apply the tools of strategy and business models in order to deliver new business creation. Topics include applying an evaluation process for the validity of a business concept, understanding the drivers for a strategic roadmap for new business execution, using a toolkit to shape a strategy with scenarios for choices of action, identifying the key measures of success. Through teams, students will form specific approaches for selected new business concepts and share them in class discussions.

Spring

49-801, Enterprise Innovation – 12 units

This course explores how business enterprises are being re-invented for today's digital era. Many firms are approaching a critical inflection point. The combined impacts of technology and globalization have revolutionized the way we operate. Software is transforming the way companies innovate; how they interact with customers and ecosystem partners, the way they collaborate and communicate, how they access and distribute information, and how they co-ordinate and control. Traditional approaches that assume "stability" have given way to "dynamic" recipes. The new imperative is to swiftly navigate changing realities.



Flexibility, versatility and the capacity to quickly adapt to evolving situations have become the critical challenges. The course is based on the new edition of Prof. Evans' book "Super-Flexibility for Knowledge Enterprises" (co-authored with Prof. Bahrami from Haas School of Business, UC Berkeley). Specifically, we will focus on the new rules of "super-flexibility" needed for continuous recalibration and adaptation.

49-804, The Leadership Challenge – 6 units

This course studies the emerging contexts for leadership - key attributes and skills, key development points, and key actions. Leadership will be discussed in changing contexts such as agile/lean environments, emerging technology such as mobility, big data, and global issues. Other topics include decision making under uncertainty, leadership and followership, acting as a connector in an ecosystem. A leader is someone who will take you somewhere that you didn't think you could go; what does this mean for teams, businesses and you personally? There will be key readings, case studies, and a retrospective.

Updated May 10, 2018