Hands-on Rapid Prototyping - UGBA 190T

DISCLAIMER

This class is hard. It's a 1.0 unit class, but it should be treated like a 3.0 unit workload for just 8 weeks. If you're serious about entrepreneurship / intrapreneurship, this class is for you. The activities and learnings are pulled from real-world entrepreneurial experiences and map to the joy, pain and hard-work experienced by successful startup founders. If you immerse yourself in the class, the content and most importantly your team project, you will leave with a high-value experience that will either change your career trajectory or give you a meaningful story about how you built something to discuss in your job interviews. The only prerequisite to this class is the relentless pursuit of truth via the scientific method as it applies to business.

SUMMARY

Many people have great ideas but seldom act on them. The Hands-on Rapid Prototyping aims to equip students with the tools and insights to quickly test their ideas, gaining feedback and traction. To realize these objectives, students will take part in hands-on activities, become familiar with the latest prototyping tools and leverage the Rapid Innovation Cycle (RIC), a process that innovates on new or pre-existing product or service concepts.

COURSE OBJECTIVES

Empower students to rapidly transcend from "I have a great idea" to "I have a great and growing product that has real customer data." By the end of the course, students should have a robust product development toolkit and a strong understanding of how to measure the market potential from a vast array of business opportunities.

HANDS-ON ACTIVITIES

Every course will start with a hands-on activity that is meant to challenge you and your teams into new ways of thinking and approaching problems. They're designed to get you out of your comfort zone. Their duration is typically 5-7 minutes with a short debrief to discuss the learning objectives.

TENTATIVE SCHEDULE

Class	Objective	First half	Second Half
#1	**Topics** ● Overview of course and expectations for the class ● Review the design-thinking processes ● Introduce the Rapid Innovation Cycle process **Assignment: due class #2**	**10 min** Hands-on Activity **25 min** Overview, expectations and motivation for class **25 min**	**35 min** Introduction to the Rapid Innovation Cycle: opportunity recognition, solution selection, market experiment, and experimental results **10 min**

	Individual ● 01: READING: "Rapid Innovation Cycle", McCoy, et. al. ● 02: SURVEY: complete student survey: Class Expectations ● 03: INSTALL: Cura & Repetier Host ● 04: CREATE: An account on TinkerCAD.com ● 05: SUBMIT: Thingiverse model scaled and exported to print in <15 min ***Teams*** ● 06: Confirm teams ● 07: Project Check-in #1 ●	Review of the design-thinking process and iteration	Teams present prototypes to class in 1 min presentations **5 min** Wrap-up/open discussion
#2	**Topics** ● Hardware Prototyping ● Digital Fabrication ● Emphasis 3D Printing ● Intro to basic 3D modeling (CAD) ● Intro to basic 3D printing **Assignment: due class #3** ***Individual*** ● 08: READING: "Innovation as a learning process", Barry & Beckman ***Teams*** ● 09: Project Check-in #2	**10 min** Hands-on Activity **10 min** Overview of Hardware Prototyping Why 3D Printing matters for hardware prototyping **10 min** Overview of Printrbot 3D Printer **10 min** Overview of 3D Printing Workflow **10 min** **Activity:** Using TinkerCAD to create your own parts	**30 min** In teams: Hands-on 3D printing workshop ● Machine setup ● 3D print Bring your laptops Students will take turns in groups getting 3D prints started **20 min** Overview of TinkerCAD Overview of Selva3D Overview of Thingiverse **10 min** Wrap-up/open discussion
#3	**Topics** ● Software Prototyping ● Web applications ● Mobile applications ● Collecting data from your market experiments ● RIC in the context of building a startup	**10 min** Hands-on Activity **30 min** 3D Design using Thingiverse, TinkerCAD and Selva3D **10 min**	**50 min** Faking it Paper Prototypes / Crazy 8's methodology Wix Software Prototype Live Demo **10 min** Wrap-up/open discussion

	Assignment: due class #4 ***Individual*** ● 10: Install PoP app on your smartphone ***Teams*** ● **All teams:** ● 11: Project Check-in #3 ● **Hardware teams:** ● 12: SUBMIT: physical hardware prototype creation and exposure to target audience	Hardware Prototyping Q&A and Start Software Prototyping discussions	
#4	**Topics** ● Collecting data from your market experiments ● RIC in the context of building a startup **Assignment: due class #5** ***Individual*** ● 13: SUBMIT: 3D CAD file for a hardware prototype (Optional) ***Teams*** ● **All teams:** ● 14: SUBMIT: basic company website ● 15: Project Check-in #4 ● **Software teams:** ● 16: SUBMIT: PoP App / PowerPoint Software Prototype and exposure to target audience	**10 min** Hands-on Activity **40 min** Recap of software prototyping tools learned thus far: crazy 8s, PoP App PowerPoint prototypes / Google Slide Prototypes Invision Prototypes (overview) Landing page prototypes	**20 min** Student Demo of Software Prototyping Mid-class Audit (led by class reps) **20 min** RIC in context of You3Dit Other examples of Rapid Prototype in the industry **5 min** Team Reports **15 min** Class Rep Evaluations
#5	**Topics** ● Introduction to Outsourcing, Crowdsourcing, and Crowdfunding **Assignment: due class #6**	**10 min** Hands-on Activity **10 min** DemoDay overview **30 min**	**10 min** Kickstarter Example: RaverRings **20 min** **Work in teams**

	Teams ● 17: Project Check-in #5	Outsourcing, Crowdsourcing, and Crowdfunding	Students use Fivver (or other tools) to outsource some aspect of the project **20 min** **Guest Speaker** TBD **10 min** Wrap-up/open discussion
#6	**Topics** ● What happens in a DemoDay ● 4D prototyping ● Service prototyping **Assignment: due class #7** ***Teams*** ● 18: Project Check-in #6	**10 min** Hands-on Activity **10 min** DemoDay overview #2 **10 min** 4D prototyping **20 min** Concierging and Service prototyping	**20 min** Team reports **30 min** Work in teams + coaching sessions **10 min** Wrap-up/open discussion
#7	● Innovating in a Corporate Environment **Assignment: due DemoDay** ***Teams*** ● 19: PREPARE: Before next class 3/25, prepare posters, demos, etc. for Demo Day. ● 20: SUBMIT all FINAL digital files to Bcourses	**10 min** Hands-on Activity **20 min** Innovating in a Corporate Environment **10 min** Course summary What's next for you after Haas **10 min** Demo Day setup	**10 min** DemoDay Q&A **40 min** Work with teams on final project, DemoDay presentation and remaining RICs **10 min** Wrap-up/open discussion
#8 (DemoDay)	● **DemoDay** **Assignment: day after DemoDay** ● 21: SUBMIT: Record a short, 2-3 minute video of your Demo Day Poster Presentation and upload it to YouTube (can be a hidden link).	**10 min** Poster Setup **40 min** DemoDay + Intro	**40 min** DemoDay Cont'd **10 min** Demo Day Wrap

Assignments, Due Dates and Make-ups

No makeup assignments. We will drop your lowest score on one, non-check-in assignment. We offer numerous ways to earn bonus points (which will go towards class participation OR assignments at the teacher's discretion). All due dates on this syllabus are tentative. All actual due dates are found on Bcourses. Use bCourses as your single source of truth.

Optional Readings and Media

The most up-to-date links and other media will be found on bCourses. While not required, these references are important readings if you want to increase your success in entrepreneurship or intrapreneurship:

#	TItle	Authors	Date	Format	Topic	Reference Comment
1	The Rapid Innovation Cycle - An innovation and market testing process for new products and services development	McCoy, C.D., Chagpar, Z., Tasic, I	2012	Article	Entrepreneurship	Market experimentation process which is the foundation for Hands-on Rapid Prototyping
2	The 4-hour Work Week	Tim Ferriss	2007	Book	Entrepreneurship	Rethink what it means to be "Rich". The "New Rich" value time and experiences...not money.
3	Innovation as a Learning Process: Embedding Design Thinking, 2007	Sara L. Beckman and Michael Barry	2007	Article	Innovation	Pioneer of Innovation as a Learning Process. Most of all the frameworks discussing innovation involve some aspect of the frameworks presented in this article.
4	The Lean Startup	Eric Ries	2011	Book	Entrepreneurship	Build, test, learn. It's that simple; which is what makes it so powerful.

5	Design a Better Business	Patrick van der Pijl, Justin Lokitz, and Lisa Kay Solomon Designed by Erik van der Pluijm & Maarten van Lieshout	2016	Book	Innovation	These people know how to innovate around business models and kickstart new products / services.
6	The Startup Owner's Manual	Steve Blank and Bob Dorf	2012	Book	Entrepreneurship	A reference manual for how to build your startup
7	How to Start a Startup	Altman, Sam	2014	Video	Entrepreneurship	Words of wisdom from those who have been in the startup trenches. Video Series by Sam Altman + Guest Speakers
8	Shoe Dog: A Memoir by the Creator of Nike	Phil Knight	2016	Book	Entrepreneurship	The amazing story of Phil Knight and how he built the Nike empire.
9	Measure What Matters	John Doerr	2017	Book	Management	Powerful story on Objectives and Key Results aka, OKRs. The tool Google used and continues to use to manage extraordinary business progress
10	The E-Myth Revisited: Why Most Small Businesses Don't work and What to Do About It	Michael Gerber	1986	Book	Entrepreneurship	Dated examples, but process and structural framework of a "franchise prototype" is helpful to get some entrepreneurs "unstuck" from being the "eternal technician".

For more recommended reading and other tools, check out this link:
http://bit.ly/rapid-prototyping-tools

EVALUATION

Class participation will be evaluated individually while projects will be evaluated ash a team. Attendance, participation, contributions and punctual submission of assignments are among the basic evaluation criteria. Most importantly, teams will be evaluated based on their ability to grasp the materials taught both in class and learned in outside activities (readings, experiments, etc.), their demonstrated ability in using the tools presented and finally, their ability to apply the fundamental concepts of the Rapid Innovation Cycle process. "The journey is more important than the destination".

Breakdown:

Class Participation (Emphasis on contribution / insight value)	20%
Non-Check-in Assignments	20%
In Class Hands-on Activities	10%
Final Project & Check-ins*	50%

** judged by both teaching team and industry professionals on the ability to execute on the Rapid Innovation Cycle process & leverage the tools taught in class.*

Details on Evaluation:

The final grading breakdown, rubrics and all other scoring is at the sole discretion of the teaching team. Although the teaching team will strive to follow this syllabus and Bcourses plan, the final grading structure, format and learner evaluations can change at anytime in an effort to create fair and optimal learning outcomes that map to real-world entrepreneurial experiences.

Class Participation - is what it sounds like. You need to be present to participate. Asking good questions and offering opinions are part of what makes a healthy classroom dynamic. If you can positively answer, "yes" to the question, "will my comment or question add value to the course or the learning experience of others?" then these are the types of comments / questions we're looking for.

Absences - You will be penalized for unexcused absences and late arrivals. We have such little time together, there is no doubt that our learning goals for you will be impacted if you miss any class or portion thereof. If you are in doubt about any absence or late arrival, email a written letter, signed by an authority and saved as PDF to formally document the absence so the teaching team can fairly process amongst your peers who attend all the sessions.

Non-Check-in Assignments - These are all group or individual assignments which are not a check in as described below.

In-class Hands-on Activities - You need to arrive on time in order to participate in these activities. They last for approximately 15 minutes only and you will be evaluated on your

successful participation in the activity, not necessarily the outcome (i.e. your paper airplane does not fly more than a foot). These exercises are to stress various skills and mindsets found commonly in entrepreneurs (problem solving, constraints, pressure, discomfort, etc.). Contribute with an open mind, a concentrated effort and a positive attitude and you'll do fine in these activities.

Final Project & Check-ins - Projects are submitted and presented in groups. Groups can form a team or can be comprised of individuals executing their own projects + RIC cycles but working together to tackle group assignments & other team-oriented class activities. Project Check-ins are submitted weekly in order to give the teaching team a clear understanding of where you and your team are at with your projects and to course correct.

FINAL PROJECT

The final projects are a product your team's adherence to the Rapid Innovation Cycle process. If you and your team follow this process, you should have a product or service that has market feedback (although possibly quite limited) and you'll have a story to tell. Again, not all experimental data is great and sometimes knowing NOT to invest time, effort and money into an idea is equally if not more important than diving into a huge project with no market interest (recall Steve Blank´s common example, "WebVan.")

Judges from both industry and academia will evaluate on the following metrics:

1. Use of the four Rapid Innovation Cycle (RIC) phases
2. Value of the project as determined by your customer / client / stakeholder feedback (proposed product or service solves a real problem or relieves a real pain)
3. Generation of a product and / or service prototypes
4. Data received and insights generated on the product / service from the iterative RIC process
5. The significance of the measured data & the key business decisions made from this data
6. The pitch / student presentation.
7. Overall uniqueness, novelty of the project

Your group's performance on the Project Check-ins is indicative of how judges will evaluate your project. It is highly recommended to address the feedback and commentary provided on your check ins.

STRUCTURE

Use of technology is permitted so long as it is focused and / or related to the course / topics / lecturers / content / etc. We understand tablet PCs, smartphones and other gadgets can be enabling. We'll permit the use of these devices until we reach a point where we believe the use is distracting to the teaching team or the surrounding students.

Every class will have a “hands-on” component – be prepared to break out of your shell, try something new and work in partners / teams.

Form your team - students will form diverse teams between 2 and 4 people in order to properly engage in the Rapid Innovation Cycle. This process—if executed correctly—will yield multiple market experiments resulting in unique and proprietary customer data ready for an industry-focused DemoDay presentation.

ACADEMIC HONESTY

All students should be familiar with the Code of Student Conduct and know that the general rules and student rights stated in that document apply to this class (see http://uga.berkeley.edu/SAS/osc.htm and http://students.berkeley.edu/osl/sja.asp). Cheating on homework, projects or the final exam may result in a failing grade for the entire course. In all cases of alleged cheating, your actions will also be reported to the Office of Student Conduct for administrative review.