15-390: Entrepreneurship for Computer Science

School of Computer Science
Carnegie Mellon University, Qatar
Spring 2018

1 Overview

Title: Entrepreneurship for Computer Science
Units: 9 units
Pre-requisites: None
Lectures: Sunday and Tuesday, 4:30 - 5:50 PM, Room 1030
Webpage: http://www.qatar.cmu.edu/~mhhammou/15390-s18/

Course Description:

This course is designed to develop skills related to entrepreneurship for computer science students. It assumes no background in business and suggests a systematic approach to translating ideas into sustainable innovation-based enterprises. In particular, it focuses on: (1) generating ideas with business potentials, (2) testing leap-of-faith assumptions via theoretical market research and empirical product development, (3) experimenting with minimal viable products and measuring progress via actionable analytics, (4) pivoting or persevering strategies based on validated learning, (5) raising venture capital the right way, (6) scaling a venture into a sustainable company via effective engines of growth, (6) managing the finance, accounting, and market aspects of a sustainable company, and (7) understanding exit policies, including initial public offering (IPO). The course comprises a balance of lectures, case studies, and encounters with entrepreneurs, investors, and business professionals. The students will be exposed to real-world perspectives on entrepreneurship, innovation, and leadership. By the end of the course, each student will develop and present a detailed business plan for a startup.

Instructor:

Mohammad Hammoud
mhhammou@qatar.cmu.edu, Room 1006, 4454-8506, Office Hours: Thursday, 10:30AM- 12:00PM.

2 Objective

Starting a new venture is a serious undertaking with a great deal of risk and sacrifice. The main objective of this course is to increase your odds of succeeding in starting, executing, and growing a company. To this end, it provides you with a scientific and practical end-to-end approach, starting from vision, idea, culture and team, passing through comprehensive market segmentation and agile product development, and extending to management and full realization of a sustainable company. The approach will either help you succeed quickly or fail faster if failure was inevitable for the path that you were on.

3 Learning Outcomes

This course incorporates fifteen major learning outcomes. In particular, after finishing this course, students will be able to:

1. Form a complementary team and create an innovative culture.
2. Conduct in-depth primary and secondary market research, select a beachhead market, and calculate its Total Addressable Market (TAM) size.
3. Identify leap-of-faith assumptions, namely the value and growth hypotheses of a startup.
4. Appreciate the build-measure-learn feedback loop as a scientific method to spiral towards testing and verifying leap-of-faith assumptions.
5. Design and develop a Minimum Viable Product (MVP) to enter the build phase of the build-measure-learn feedback loop as quickly as possible.
6. Test MVP with early adopters, collect feedback, and apply actionable analytics to steer or pivot MVP towards a Viable Product (VP).
7. Apply split-test (or A/B) experiments to evaluate different variations of a MVP or VP feature.
8. Identify different engines of growth (e.g., viral and paid engines of growth) to determine product-market fit and achieve a sustainable business.
9. Differentiate between various types of pivots (e.g., zoom in, zoom out, customer segment, and engine of growth pivots).
10. Design a business model, set a pricing framework, calculate the Lifetime Value (LTV) of an acquired customer, and compute the Cost of Customer Acquisition (COCA).
11. Value pre-revenue and post-revenue companies.
12. Differentiate between different corporate metrics (e.g., price-to-earnings ratio and return-on-assets), stock types, bonds, equity, and debt.
13. Understand the venture capital financing process and raise money for a startup the right way.
14. Apply accrual accounting and interpret the three core financial statements, namely, the balance sheet, income statement, and cash flow statement.
15. Recognize different exit policies (e.g., Initial Public Offering).

4 Course Textbook

There is no specific textbook assigned for the course, but here are some references that you can refer to:

- “Disciplined Entrepreneurship” by Bill Aulet
- “The Lean Startup” by Eric Ries
- “Venture Deals” by Brad Feld and Jason Mendelson
- “How Google Works” by Eric Schmidt and Jonathan Rosenberg
- “Work Rules!: Insights from Inside Google That Will Transform How You Live and Lead” by Laszlo Bock
- “Crossing the Chasm” by Geoffrey A. Moore
- “Blue Ocean Strategy” by W. Chan Kim and Renée Mauborgne
- “Inbound Marketing” by Brian Halligan and Dharmesh Shah
- “Business Model Generation” by Alexander Osterwalder and Yves Pigneur
- “The 7 Habits of Highly Effective People: Powerful Lessons in Personal Change” by Stephen R. Covey

5 Assessment

Each student will receive a numeric score with a corresponding letter grade, based on a weighted average of the following:

1. **Projects:** You will have one project that counts for 30%.

2. **Exams:** There will be two in-class exams - midterm and final - which combined will account for 35% of your final score. The midterm is worth 15% and the final is worth 20%.

3. **Problem Sets:** There will be 6 assignments. At the end of the semester, the assignment bearing the lowest score will be dropped. The remaining 5 assignments will altogether contribute 20% towards your final score. It follows that each assignment is worth 4%.

4. **Quizzes:** There will be 2 quizzes, which together account for 10% of your final score. These quizzes are meant to test your understanding and preparation for the concepts covered throughout the course.

5. **Class Participation and Attendance:** Your attendance of classes as well as your participation in discussions will count for 5% of your final score.

The table below shows the breakdown of the five forms of activities that the course involves, alongside the quantity and the overall weight of each activity.

Type	#	Weight
Projects	1	30%
Exams	2	35%
Problem Sets	6	20%
Quizzes	2	10%
In-class Participation and Attendance	28	5%

Table 1: Assessment Methods

6 Getting Help

For urgent communication with the instructor and the teaching assistant, it is best to send an email (preferred) or give a phone call. If you want to talk to any of them in person, remember that their posted office hours are merely nominal times when they guarantee that they will be in their offices. You are always welcome to visit them outside of their office hours if you need help or want to talk about the course.

We ask that you follow a few simple guidelines. The instructor normally works with his office door being open. Whenever the office door is open, he welcomes visits from students. However, if his office door is closed, this means that he is busy with meetings or phone calls, thus prefers not to be disturbed.

We will use the course webpage as the central repository for all information about the class. Through the webpage, you can:

1. Obtain copies of any handouts or assignments. This is especially useful if you miss a class or lose a document.
2. View announcements that relate to the course.
3. Find links to any electronic data you need for your assignments.
4. Read clarifications and changes made to any assignments, schedules, or policies, if necessary.

Lastly, you can use **Piazza** for asking questions and receiving answers without using emails! Posting your questions on Piazza will help the whole class benefit, and will certainly avoid redundancy. Find our class Piazza page at: https://piazza.com/qatar.cmu/spring2018/15390/home

7 Cheating

Each project or assignment must be the sole work of the student turning it in. Projects and assignments will be closely monitored, and students may be asked to explain suspicious similarities with any write-up. The following are guidelines on what cheating is and is not:

What is cheating?

Sharing written assignments: either by re-writing, looking at, or supplying a copy of an assignment.

What is NOT cheating?

Clarifying ambiguities or vague points in class handouts.

Consequently, be aware of what constitutes cheating (and what does not) when interacting with your colleague students. Same rules of cheating as above apply when collaborating with other students. In short, you cannot share written assignments, and/or other electronic files with other students. If you are unsure, ask the teaching staff.

Finally, be sure to store your work in protected directories. The penalty for cheating is severe, and might jeopardize your whole career as a student – cheating is not worth the trouble. By cheating in the course, you are cheating yourself; the worst outcome of cheating is missing an opportunity to learn. Besides, you will be removed from the course and assigned a failing grade. We also place a record of the incident in your permanent university profile.

8 Health & Wellness

Learning Disabilities

Carnegie Mellon University is committed to providing reasonable accommodations for all persons with disabilities. To access accommodation services you are expected to initiate the request and submit a Voluntary Disclosure of Disability Form to the office of Health & Wellness or CaPS-Q. In order to receive services/accommodations, verification of a disability is required as recommended in writing by a doctor, licensed psychologist or psycho-educational specialist. The office of Health & Wellness, CaPS-Q and Office of Disability Resources in Pittsburgh will review the information you provide. All information will be considered confidential and only released to appropriate persons on a need to know basis.

Once the accommodations have been approved, you will be issued a Summary of Accommodations Memorandum documenting the disability and describing the accommodation. You are responsible for providing the Memorandum to your professors at the beginning of each semester.

For more information on policies and procedures, please visit

https://scotty.qatar.cmu.edu/qword/student-affairs/office-of-health-and-wellness/assistance-for-individuals-with-disabilities/

Taking Care of Yourself

Do your best to maintain a healthy lifestyle this semester by eating well, exercising, getting enough sleep, and taking some time to relax. This will help you achieve your goals and cope with stress.

All of us benefit from support during times of struggle. You are not alone. There are many helpful resources available on campus and an important part of the college experience is learning how to ask for help. Asking for support sooner rather than later is often helpful.

If you or anyone you know experiences any academic stress, difficult life events, or feelings like anxiety or depression, we strongly encourage you to seek support. Counseling and Psychological Services (CaPS-Q) is here to help: call 4454 8525 or make an appointment to see the counselor by emailing student-counselling@qatar.cmu.edu. Consider reaching out to a friend, faculty, or family member you trust for help.

If you or someone you know is feeling suicidal or in danger of self-harm, call someone immediately, day or night, at 5554-7913. **If the situation is life threatening, call 999.**

9 Course Schedule

Table 2 demonstrates the ***tentative*** schedule of the classes. Alongside, it indicates the project and the assignment activities. Any changes will be announced and reflected on the course webpage. An updated schedule will be always maintained on the course webpage.

Week	Session	Date	Topic	Teaching Method	Projects	Problem Sets
1	1	7 Jan	Course Overview & Introduction	Lecture		
	2	9 Jan	Market Segmentation and Research- Part I	Lecture		
2	3	14 Jan	Market Segmentation and Research- Part II	Lecture	Start P1	
	4	16 Jan	Build-Measure-Learn - Part I	Lecture		Start PS1
3	5	21 Jan	Build-Measure-Learn - Part II	Lecture		
	6	23 Jan	Build-Measure-Learn - Part III	Lecture	End of P1 Checkpt. 1	

4	7	28 Jan	Build-Measure-Learn - Part IV	Lecture		End PS1
	8	30 Jan	Business Models and Pricing Frameworks - Part I	Lecture		Start PS2
5	9	4 Feb	Business Models and Pricing Frameworks - Part II	Lecture		
	10	6 Feb	Quiz I	N/A		
6	11	11 Feb	Startup Valuation - Part I	Lecture		End PS2
	-	**13 Feb**	**Sports Day**	**No Class**		
7	13	18 Feb	Startup Valuation - Part II	Lecture		Start PS3
	14	20 Feb	**Midterm**	**Exam 1**		
8	15	25 Feb	Finance- Part I	Lecture	End of P1 Checkpt. 2	
	16	27 Feb	Finance - Part II	Lecture		End PS3
Spring Break March 4 - 9						
9	17	11 Mar	Finance - Part III	Lecture		Start PS4
	18	13 Mar	Venture Deals - Part I	Lecture		
10	19	18 Mar	Venture Deals - Part II	Lecture		
	20	20 Mar	Venture Deals - Part III	Lecture		End PS4
11	21	25 Mar	Accounting - Part I / Guest Lecture	Lecture		Start PS5
	22	27 Mar	Accounting - Part II	Lecture	End of P1 Checkpt. 3	
12	23	1 Apr	Accounting - Part III	Lecture		
	24	3 Apr	Exit Policies	Lecture		End PS5
13	25	8 Apr	Quiz II	N/A		
	26	10 Apr	Student Presentations	Lecture		Start PS6
14	27	15 Apr	Student Presentations	Lecture	End of P1 Checkpt. 4	
	28	17 Apr	Final Exam Review	Lecture		End PS6
	29	**TBA**	**Final**	**Exam 2**		

Table 2: Tentative Time-Line of the Course

Notations:

- **PS:** Problem Set
- **P:** Project