



## Venture Capital and the Finance of Innovation

Spring 2009  
M/W JMHH G55  
10:30am & 1:30pm

FNCE 750  
Sections 1 & 2

Professor  
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Office hours: Mondays 3:30-5:00, and by appointment. Please email suggested times.

Questions can be asked via email as well.

### OBJECTIVES

This course examines VC finance and the related practice of R&D finance. The aim of the course is to apply finance tools and concepts to the world of venture capital and financing of projects in high-growth industries. Students will be introduced to all the institutional aspects of the venture capital industry, but the course is *not* a survey course. Rather, it is structured as a finance course and we will analyze various aspects of VC finance and R&D finance using an investor's perspective (as opposed to an entrepreneur's). The ideal audience for the course is 2<sup>nd</sup> year MBA students interested in both VC *and* finance. For those of you, the course offers lots of interesting applications of all major finance tools --- from discounted cash flows to option-pricing models to Monte Carlo simulations. If you are looking for a qualitative survey course of the VC industry, on the other hand, you will likely be frustrated (if not exasperated!) with the degree of quantitative work involved. That said, the course requires nothing more than the 1<sup>st</sup> year core courses as prerequisites.

In particular, we will explore the following four major questions:

1. How do VCs organize and manage their funds? (VCs as funds)
2. How can we evaluate prospective portfolio companies? (Total valuation module)
3. How can we evaluate VCs' stakes in the portfolio companies and how do terms of investments affect them? (Partial valuation module)
4. How can we evaluate R&D investments? (R&D finance module)

Each question is explored in 5-6 consecutive classes which constitute a module. After the first 2 modules, we will have a quiz. After 1 more module, we will have another quiz. After the last module, we will have a final exam covering the entire class.

### HOW USEFUL IS THIS?

The usefulness of this course to the targeted audience (2<sup>nd</sup> year MBA students interested in both VC *and* finance) is twofold, one direct, and another indirect (but not less valuable). First, students will learn a lot of relevant *empirical facts*---how the VC industry is organized, what kind of risk and return characteristics VC investments have experienced historically, what VC term sheets look like and which pieces are important and why, how R&D investments are conducted, etc. Armed with these facts that are presented with data and analysis, you will likely become a better-

informed participant in the industry, whether as a VC, entrepreneur, institutional investors, investment bankers, or corporate lawyers.

Second, students will learn how financial economists would evaluate (portfolio) companies as a whole and (VCs') stakes in the companies as a part of the whole, using various financial modeling tools. There is an element of what I call "fake head" or indirect learning in this second objective<sup>1</sup>. While you learn how to do this in the specific context of VC and R&D finance, you will also learn how to evaluate any investments as financial economists would. DCF, comparables, option-pricing models, Monte Carlo simulations, real options, and binomial trees---these are analytical tools that have proved to be very powerful in various spheres of the financial world. It is safe to say that valuations done this way are powerful enough to influence every corner of the markets. Whether you will advance your career in the financial sector or elsewhere, the better you understand this way of thinking, the more successful you will be, especially when combined with your superb negotiation, networking, forecasting, golf (OK, maybe not golf) and other vital skills that you have already acquired elsewhere.

#### **HOW DOES THE COURSE COMPARE TO OTHERS?**

The course will complement entrepreneurship finance courses offered by the Management Department. There will be some overlapping materials in the first half (where we learn the basics of the venture capital industry), but virtually no overlap in the second half of the semester (where we tackle more advance finance topics).

#### **READINGS**

The required primary text for the course is *Venture Capital & the Finance of Innovation (VCFI)* (John Wiley and Sons) which is available in the bookstore.<sup>2</sup> The Bulkpack containing case readings is available at Reprographics. The cost of handouts distributed in class will be billed at the end of the semester. All materials handed out in class will also be made available electronically on Webcafe during the course (except, of course, for copyrighted readings.)

#### **EVALUATION**

There will be two quizzes counting for 15% each (for a total of 30%) and one final exam counting for 45% of the course grade. The final exam will cover the entire course. For students who show an exceptional improvement in performance in the final exam compared to the average of the two quizzes (either an increase of at least

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<sup>1</sup> I borrow the term "fake head" learning from the "Last Lecture" by Randy Pausch, a renowned computer scientist who is diagnosed with terminal cancer. The transcript of the lecture can be downloaded from <http://www.cs.cmu.edu/~pausch/>. Among other things, he discusses (as examples of "fake head" learning) how high school football taught him so much more than football itself (e.g., sportsmanship, leadership, perseverance...), and how an educational program called Alice taught millions of kids how to do computer programming by making them believe they were building games and movies.

<sup>2</sup> The book is in its first edition and contains some typographic errors. The list of known corrections (as of 01/08) is available in the "Textbook" folder of Webcafe.

20 percentiles in rankings or 20% in scores) the weights will be changed to 15% total for the quizzes and 60% for the final. Students may use one double-sided page of notes for the quizzes and two double-sided pages of notes for the final exam. There will also be 4 assignments counting for 25% of the course grade (6% each except the third assignment which will count for 7%).

To determine the final grade distribution, a numerical weighted average of the four components will be computed. The faculty's recommended grade distribution is used as a guideline, and will be adjusted up or down depending on overall class performance.

Attendance is very important for this class because there will be a lot of diagramming exercises (of VC exit values), especially in the second half of the course. We will do this in class in real time, which is the best way to learn how to think visually. It is a lot of fun, and it is something that you have not done in other classes. So, if you must miss classes, choose wisely. The best classes to miss are in the first half (class 1-12), when things are easier to catch up. The worst classes to miss are in the second half, when things become more advanced, and are harder to catch up on your own.

While attendance and class participation are not explicitly counted, they will be taken into account for students whose weighted average fall near a boundary of a grade cutoff. If medical problems force you to miss an examination, please contact me *before* the exam.

#### **CLASSROOM STANDARDS**

When arriving late or leaving early for legitimate reasons, please email me in advance for date/section/reasons, and be respectful of your fellow students by minimizing disruption when you come in/leave.

#### **TEACHING ASSISTANTS**

[TBD] ([@wharton.upenn.edu](mailto:@wharton.upenn.edu))

The TAs' office hours and locations will be uploaded to the Webcafe calendar in the next week.

#### **STUDY TEAMS**

Homework assignments can be done individually or in teams of up to two (but no more than two) students. Students may form teams across sections. MBA students and undergraduate students may not be on the same team. Working in teams is strongly encouraged but is not compulsory. If students work as a team, both members of the team will receive the same grade. Students working in teams are responsible for printing names of both students on the cover page of assignments. Here is an important message from the Webcafe Tech team: You are welcome to use the project folder feature of Webcafe, but please follow the security instructions and make sure that no students other than you and your teammate can access the folders

you create. Otherwise, **any updates to your work will not only be public but also will be notified to the whole class in nightly email notifications.**

#### ASSIGNMENTS

Each homework assignment will be evaluated on a 10-point scale. They will be used as learning tools for vocabulary and for solving models. **Please use no more than 3 pages of write-ups and 3 pages of attachments (tables, charts) for each assignment.** For questions requiring calculations, please explicitly write out and explain your calculations in your write-ups whenever possible. Doing this, rather than merely copying the final numbers from your spreadsheets, has two benefits. First, it will help you prepare for examinations, when you will need to rely only on calculators. Second, it will help us understand what you did and give you credit accordingly. In completing the assignments, students may not use any materials from previous offerings of the course.

#### VIDEOTAPING SESSIONS

Exam review sessions and guest speaker lecture(s) will be videotaped and made available on Wharton Video Network. In addition, the class sessions that coincide with religious holidays (Apr. 21) will also be videotaped in accordance with the University policy.

#### COURSE SCHEDULE , READINGS AND DUE DATES

Please note that the schedule is approximate; some chapters will take longer than a lesson and others will take a shorter time. If anybody has a problem meeting a due date because of religious holiday, please let me know as soon as possible. Extensions will be granted in such cases. VCFI refers to the textbook *Venture Capital and the Finance of Innovation*. In addition, some handouts will be given out as supplemental readings in class.

Wed	Jan. 14	Introduction	VCFI Ch. 1
Mon	Jan. 19	NO CLASS (Martin Luther King Holiday)	None
Wed	Jan. 21	Who are the VC players?	VCFI Ch. 2
Mon	Jan. 26	Returns to VC Investments	VCFI Ch. 3
Wed	Jan. 28	The Cost of Capital in VC	VCFI Ch. 4
Mon	Feb. 2	The Best VCs	VCFI Ch. 5
Wed	Feb. 4	VC Around the World	VCFI Ch. 6
<b>Mon</b>	<b>Feb. 9</b>	Speaker 1: Erik Hirsch Chief Investment Officer, Hamilton Lane [ ]-6:00pm, JMHH [ ] (to be videotaped)	Attendance required

Wed	Feb. 11	VC Investments	VCFI Ch. 7 Accel case <b>HW 1 due</b>
Mon	Feb. 16	Term Sheets	VCFI Ch. 8 Walnut case
Wed	Feb. 18	Preferred Stock	VCFI Ch. 9
Mon	Feb. 23	The VC Method	VCFI Ch. 10
Wed	Feb. 25	Review session in class (to be videotaped)	<b>HW 2 due</b>
Mon	Mar. 2	Quiz 1 (covering ch. 1-12) in class	
<b>Wed</b> (or Th)	<b>Mar. 4</b> (or 5)	Speaker 2: Ted Schlein, Partner, Kleiner Perkins Caufield & Byers	Attendance required
	Mar. 9- Mar. 13	Spring break Enjoy!	
Mon	Mar. 16	DCF analysis of Growth Companies & Comparables	VCFI Ch. 11 & 12
Wed	Mar. 18	Option Pricing	VCFI Ch. 13
Mon	Mar. 23	The Valuation of Preferred Stock	VCFI Ch. 14
Wed	Mar. 25	Speaker 3: Sherrill Neff Founding Partner, Quaker BioVentures <b>[]-6:00pm, JMHH [ ]</b> (to be videotaped)	
Mon	Mar. 30	Later-Round Investments	VCFI Ch. 15
Wed	Apr. 1	Participating Convertible Preferred	VCFI Ch. 16 Metapath case Securicor case
Mon	Apr. 6	Implied Valuation	VCFI Ch. 17 Walnut case
Wed	Apr. 8	Review session in class (to be videotaped)	<b>HW 3 due</b>
Mon	Apr. 13	Quiz 2 (covering ch. 13-17)	

Wed	Apr. 15	R&D Finance	VCFI Ch. 19
Mon	Apr. 20	Monte Carlo Simulations	VCFI Ch. 20
			<b><i>HW4</i></b>
			<b><i>(Metapath case) due</i></b>
Wed	Apr. 22	Real Options	VCFI Ch. 21
Mon	Apr. 27	R&D Valuations / Wrap-up lecture	
	TBA	Review session	
[]	[]	Final exam (covering the entire semester)	
	[]	Location TBA	