

**FINA 7372/4372 , PETR 6310**  
**Upstream Economics**

**Fall 2017**

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The objectives of the course are:

Understanding the business decisions involved with the exploration and production of oil and gas, including dealing with high levels of risk and uncertainty

Ability to prepare and analyze cash flow forecasts for oil and gas production operations

Understanding the basis for evaluating petroleum reserves and their financial significance.

Understanding issues associated with dealing with sovereign owners of natural resources.

**Instructor**

The instructor is D. H. Bellman. Prior to working with the Global Energy Management Institute, Professor Bellman spent thirty-five years at Exxon. He gained experience in a wide variety of functions, from global strategic planning and investments, to acquiring raw materials, to plant operations, to sales. He earned a bachelor's degree in mechanical engineering at Duke University, and a master's degree in business administration at Stanford University.

**Materials**

Textbook: No required textbook

Case Studies: "Journey To Sakhalin (A)," Harvard Business School, 2007. Obtain a copy online from Harvard Business Publishing Web Site using this link:

<http://cb.hbsp.harvard.edu/cbmp/access/65692519>

Other case studies provided on Piazza

**Recommended Reference Books**

1. *Oil & Gas Production in Nontechnical Language*, Martin Raymond and William Leffler (PennWell Publishing, 2006) ... excellent for those not familiar with oil and gas operations yet
2. *Project Economics and Decision Analysis, Volumes 1 and 2, 2<sup>nd</sup> ed.*, M. A. Mian, (PennWell Publishing, 2011) ... *in depth text on financial and decision analysis techniques*
3. *Oil and Gas Property Evaluation*, John Wright, (TW LLC, 2015) ... *in depth text on operating and financial analysis techniques, substantial petroleum engineering content.*

## **Course Requirements**

1. Participation on a student team in a competitive simulated oil and gas exploration and production venture (OilSim), concluding with an assessment of the team's results and lessons learned
2. Financial analysis of team OilSim results
3. Brief team recommendation memos relating to case studies discussed in class
4. A final examination

## **Office Hours**

Mondays and Wednesdays, 12:00 to 5:00 p.m., by appointment

## **Extra Help If You Need it**

Counseling and Psychological Services (CAPS) can help students who are having difficulties managing stress, adjusting to college, or feeling sad and hopeless. You can reach CAPS ([www.uh.edu/caps](http://www.uh.edu/caps)) by calling 713-743-5454 during and after business hours for routine appointments or if you or someone you know is in crisis. Also, there is no appointment necessary for the "Let's Talk" program, which is a drop-in consultation service at convenient locations and hours around campus.

[http://www.uh.edu/caps/outreach/lets\\_talk.html](http://www.uh.edu/caps/outreach/lets_talk.html).

## **Class Schedule, Topics and Assignments**

Session 1 8/21/17

- Course introduction and administration
- Overview of the exploration and production value chain

Read: Wallace-Wells, in the New York Times, January 14, 2011, "The Will To Drill"  
- Chapter 1 in "Oil and Gas Production" (optional)

Session 2 9/11/17

- Financial analysis of the upstream business
- Oil and gas reserves
- Introduction to OilSim

Read: Pages 7 to 33 and 109 to 127 in "Guidelines for Application of the PRMS"  
- Simmons, "Calculating Oil and Gas Reserves"  
- Loder and Issac, "We're Sitting on 10 Billion Barrels of Oil! OK, Two"  
- "Supermajordämmerung," in The Economist, August 3, 2013

Review: "Example Spreadsheet Model"

Session 3 9/18/17

- Financial analysis homework discussion
- Identify possible petroleum blocks to explore
- OilSim challenge 1: Nominate blocks to be included in the licensing round, using geographic maps, and magnetic and gravimetric survey data.

Preparation: Financial analysis homework

Download: 2017 Block Financial and Operating Report template

Read: Oil Lease Checklist  
OilSim Bitesize Description

Session 4 9/25/17

- OilSim challenge 2: Identify the most promising of the blocks offered for lease and prepare bids, using common risk segment maps and 2D seismic surveys
- Submit bids and learn results
- Record financial results
- OilSim challenge 3a: initiate negotiation of farm-ins and farm-outs with other teams, after obtaining 3D seismic surveys

Preparation: Review of 2D seismic data from Session 3  
Agree on your team's bidding and partnership strategies.

Session 5 10/2/17

- Discovery and appraisal of petroleum reserves
- Complete participation negotiations (Challenge 3a)
- OilSim challenge 3b, wildcat and appraisal drilling
- Review progress and record financial results

Preparation: Participation strategy and offers  
Deepwater  
Wildcat and appraisal plan

Read: Pages 35, 36, 78 and 79 in "Guidelines for Application of the PRMS"  
- Campbell, "Deepwater Spills and Short Attention Spans"  
- Chapters 5 and 6 in "Oil and Gas Production" (Optional)

Scan: Example deep water exploration plan

Session 6 10/9/17

- Review results of the exploration phase
- Reservoir depletion
- OilSim challenge 4: Prepare a depletion plan for every reservoir to be developed and determine the initial expected detailed production profile for each.

Read: Shell, "Oil and Gas Offshore Production"  
- Pages 9 to 20 in Shell, "Deepwater Development"  
- Chapters 7 and 8 in "Oil and Gas Production" (Optional)

Session 7 10/16/17

- Field processing and transportation
- Natural gas and natural gas liquids
- OilSim challenge 5: Plan the facilities to produce the oil and gas that has been found in the block.
- OilSim challenge 6a: Plan the construction of needed facilities, including cost and time estimates

Read: Pages 4 – 16 in ABB, “Oil and Gas Production Handbook”  
– Chapter 9 in “Oil and Gas Production” (Optional)

Session 8 10/23/17

- OilSim challenge 6b: Construction Plan execution
- Record production and financial data

Preparation: Facility construction plan

Read: Santiago & Magallon, “Critical Path Method”  
- NetMBA.com, “PERT”

Session 9 10/30/17

- OilSim challenge 7: Adapt/react to events occurring during the production life of the venture.
- Review financial results through challenge 6.
- Introduction to “IW Oil & Gas” case

Preparation: Financial Homework #3

Session 10 11/6/17

- Integrating project economics (Guest lecturer)

Read:

- Ernst and Young, “Spotlight on Oil and Gas Megaprojects,” 2014
- Merrow, in Oil and Gas Facilities, April 2012, “Oil and Gas Megaprojects,”
- Robinson, “Offshore Megaprojects: Why we fail and how to fix it”
- Chapter 10 in “Oil and Gas Production” (Optional)
- Pages 111 to 173 and 190 to 195 in Mian, “Project Economics and Decision Analysis,” Volume 1 (Optional)

Session 11 11/13/17

- The value of information
- Real options
- Risk preference and tolerance

Read: Coopersmith and Cunningham, "A Practical Approach to Evaluating the Value of Information and Real Option Decisions"

- Coopersmith, Burkholder and Schulze, "Improving Exploration, Appraisal & Pilot Planning"

Session 12 11/20/17

- Review and discuss results of OilSim venture and lessons learned
- IW Oil & Gas case discussion
- Unconventional production (Guest lecturer)
- Introduction to Ambitious Oil Company (A) and "Journey to Sakhalin" cases

Preparation: Individual reappraisals of the OilSim ventures to be submitted before class  
IW Oil & Gas recommendation brief

Read: Aguilera and Radetski, in the Oil & Gas Journal, December 2, 2013, "Shale gas and oil: fundamentally changing global energy markets"

Session 13 11/27/17

- Ambitious Oil Company (A) case discussion
- Petroleum fiscal systems
- "Journey to Sakhalin" case discussion
- Final exam preview

Preparation: "Ambitious Oil Company (A)" recommendations brief (one per team)  
Sakhalin recommendation brief (one per team)

Final Exam 12/8/17