



**Center for Economics and Management**

**PETROLEUM ECONOMICS AND  
MANAGEMENT PROGRAM  
Spring and Summer Terms**

**SYLLABUS**

9<sup>th</sup> of June 2008

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## INTRODUCTION

*The IFP School is an engineering school which offers eleven Masters degree programs covering the oil and gas industry, the petrochemicals sector and the automotive industry.*

*The School's primary objective is to provide training programs that directly meet the needs of industry, enabling students to access a wide range of positions at the beginning of their professional careers and for them to be immediately operational in the workplace.*

*To reach this goal, the program's objectives are to provide students with the knowledge and skills they will need to perform efficiently as professionals in the sectors of activity covered by the various study programs, i.e.:*

- *the required theoretical knowledge specific to their sector of activity,*
- *the practical, technical and economic knowledge required by professionals in their field,*
- *effective working methods (project management, communication techniques etc.) relevant to their area, including the opportunity to practice these skills in a professional environment,*
- *general knowledge of the petroleum and automotive industries*
- *familiarization with the non-technical (human, cultural, ethical etc.) aspects of corporate life, with the sharing of ideas and discussion between students. In this way, all students benefit from the collective professional experience existing within the class to further their motivation for, and knowledge and realistic expectations of life in industry. Furthermore, the sharing of experiences and views between students creates a strongly multicultural environment owing to the wide range of nationalities represented within the school.*

*These skills and knowledge are acquired through lectures, tutorials, practical work, projects and training periods in industry. Lecturers at the IFP School come from a variety of backgrounds including industry, R&D centers and the IFP School. In all cases, they are chosen for both their teaching ability and their professional expertise in order to maximize the passing on of knowledge and experience to the students.*

*Course material is organized into "Teaching Units" to allow the content of the program to be structured around the fundamental themes of each domain. This helps the student develop a solid understanding of the material presented in the program, as well as ensuring the pertinence, coherence and completeness of the overall program. Each teaching unit is managed by a coordinator who is responsible for overseeing the development and evolution of the course content as well as the quality of teaching within that unit.*

*ECTS<sup>(1)</sup> credits are allocated to each teaching unit and are awarded to the student upon satisfactory completion of the required examinations and/or other assessment in that unit. The primary aim of this assessment is to verify that the student has properly assimilated the necessary theoretical knowledge and furthermore that the student is able to apply it in the solution of a concrete problem. For this reason, student evaluation at the School incorporates a large amount of personalized, interactive testing (in particular, oral examinations and projects). This leads to a more relevant and complete assessment of the student's capabilities as it considers both the student's technical*

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<sup>(1)</sup> European Credit Transfer System

*understanding as well as his/her ability to communicate this knowledge effectively and accurately and to apply it to a given problem objectively and rigorously.*

*The objectives and syllabus of each study program are discussed and agreed upon each year with the IFP School industry partners at dedicated steering committee meetings. These meetings enable the school to identify what evolution in course content or organization, if any, is necessary in order that students graduating from the school meet the expectations and needs of industry.*

*In addition, students are asked to fill out a questionnaire concerning the quality and content of every course and its relevance to the predefined objectives of the program. The results of these evaluations allow changes to be made to the courses where necessary.*

*To be awarded the IFP School degree, students must pass all the teaching units required in the program. This may include passing a supplementary examination if the student is not successful in the first assessment. Only one supplementary examination for each teaching unit is allowed, and a maximum of four teaching units may be passed by supplementary examination.*

*If a student fails one teaching unit (or in exceptional cases, two teaching units) and the relevant supplementary examination/s, the board may still award the degree if the student's overall performance is deemed to be sufficient. In this case, the personal investment, progress and general attitude of the student throughout the study program are also taken into consideration.*

*Note however that the degree is not awarded if the student fails more than two teaching units.*

## **1. OBJECTIVES AND ORGANIZATION OF THE PROGRAM**

# **INTERNATIONAL COLLABORATIVE PROGRAM**

## **PETROLEUM ECONOMICS AND MANAGEMENT PROGRAM (PEM)**

### **1.1 GENERAL OBJECTIVES**

The International Collaborative Program in Petroleum Economics and Management is designed for students or professionals with degrees in science, engineering or social science, seeking in-depth training to develop a commanding skill set in petroleum techniques, petroleum economics and management.

Aimed at developing internationally-minded professionals able to take up managerial positions requiring multidisciplinary skills, the Program offers a unique opportunity to complement technical skills with management know-how and economic insight and to acquire real-world knowledge from a faculty with strong ties to industry, in activities like management, research and consulting.

Participants will gain international experience by studying in France and in the United States of America or Russia and through contacts with students, professionals and faculty from many countries.

On completion of the Petroleum Economics and Management Program and in particular at the end of the period January - July spent at the IFP School, students are expected to:

- be able to take up a position requiring multidisciplinary skills in the energy sector,
- be internationally minded and capable of teamwork in an international context,
- gain an understanding of the upstream and downstream petroleum sectors in their economic, commercial, financial and environmental dimensions (key economic data and characteristics, management tools, etc.) and technical dimensions for the students who choose the curriculum with technical courses ( reservoir engineering, refining processes, etc.),
- be capable of using the main management and decision-making tools for making and justifying operational decisions.

### **1.2. TRAINING TECHNIQUES**

These objectives are achieved through the use of a number of training techniques, including :

- Lectures with many examples
- Conferences given by experts of the industry and Professors from Universities
- Applied Sessions
- Syndicate working on case studies and projects
- Individual assignments to reflect and critique current approaches
- Visit of a refinery and a plant.

### **1.3. CURSUS AND DEGREES AWARDING**

*The detail in terms of number of required courses and credits (ECTS) is given § 1.6*

The length of the course and the degree awarded depend on the type of first degree that the student has obtained, his/her professional experience and the kind of cursus chosen: with two degrees in the case of a collaborative program (with CSM, TAMU, OU or Gubkin University) or one degree in the case of a program taken only in IFP School or with credits transferred from the university of Dundee, the BI Norwegian School of Management, ESCP-EAP, ESSEC or Audencia.

The duration is usually 16 months (minimum is 11 months and the maximum is 22 months).

#### **1 – General Case**

Students admitted to the School after 4 years of higher education (« bac+4 ») with a degree such as a BS from an American university or an MSc from a British university or students admitted after 5 years of higher education (« bac+5 ») with a degree not in accordance with the standards of the « Commission des Titres d'Ingénieurs (CTI)» for French institutions or a degree considered equivalent by a recognized board for foreign institutions.

**They can be awarded a DNM (« Master's degree in Petroleum Economics and Management») after 16 months.**

#### **2 – Students with a "diplôme d'ingénieur" or equivalent**

Students concerned are those admitted to the School with a degree corresponding to 5 years of higher education (« bac+5 ») in accordance with CTI standards or equivalent.

These students can **be awarded the "diplôme d'ingénieur (DI)" after 16 months**, including 4 months spent on work placement (single degree) **or 20 months** (work placement included) in the case of a double degree. This period in industry may be waived if the student already has at least 4 months of professional experience accepted by the IFP School as equivalent to the industry placement. To get this degree, the two technical courses (Upstream and Downstream) are compulsory.

#### **3 – Students admitted under a « bac+4 » agreement**

These are students from schools or universities that award an engineering degree in accordance with CTI standards or equivalent and who are admitted to the IFP School at « bac+4 » (i.e. at the end of their penultimate year of a 5 year engineering course) under an agreement signed by their school and the IFP School. In the PEM Program, they can be admitted only if they have spent one year abroad (année de césure).

They can **be awarded the "diplôme d'ingénieur (DI)" after 22 months** (16-month Program followed by a 6-month work placement validated by the IFP School).

**Internship/Work Placement period:** the student is required to submit monthly reports. The report should be more than a simple activity report (ie. Technical report with a description of the work status) – it should also include a discussion of the student's non-technical experiences in industry, and any difficulties that the student has come across. The internship is assessed on the basis of the evaluation of the company supervisor and the IFP School coordinator and the pertinence and quality of work carried out, the personal and professional skills demonstrated by the student during the internship and the final report to be submitted at the end.

In addition, students preparing the DNM must give an oral presentation (or at least a telephone interview for students abroad).

## Degrees from the partner University

In the case of a collaborative program, the student can get also the degree of the Partner University:

- Master of Science in Mineral Economics from Colorado School of Mines,
- Master of Engineering from Texas A&M University,
- Master of Arts in Managerial Energy Economics from Oklahoma University

## **1.4. PROGRAM STRUCTURE**

The program consists of 4 different **Terms (double degree)**:

- **A first Fall Term** (from end of August year n to end of December year n) at Colorado School of Mines, Texas A&M University, Oklahoma University or Gubkin University
- **A Spring Term** at IFP School (from January year n+1 to end of April year n+1)
- **A Summer Term** at IFP School (from April year n+1 to end of July year n+1)
- **A second Fall Term** (from end of August year n+1 to end of December year n+1) at Colorado School of Mines, Texas A&M University or Oklahoma University or Gubkin University

It is also possible to spend a Spring and a Summer Terms in IFP School, and study a Fall semester either in the University of Dundee in Scotland (Centre for Energy, Petroleum and Mineral Law and Policy) or in the BI Norwegian School of Management or in the ESCP-EAP or in ESSEC or in Audencia. In that case, the student gets **only the IFP School degree**.

The program in IFP School is divided into three parts:

<b>Business &amp; Management</b>	<ul style="list-style-type: none"><li>▪ Business Accounting (1)</li><li>▪ Organizational Behavior (1)</li><li>▪ Strategic Marketing &amp; Management (2)</li></ul>	
	<b>Economics</b>	<b>Techniques</b>
<b>Oil &amp; Gas</b>	<ul style="list-style-type: none"><li>▪ Energy Economics &amp; Development (1) + (2)</li><li>▪ Energy Geopolitics (1)</li><li>▪ Upstream Management (1)</li><li>▪ Downstream Management &amp; Sustainable Development (2)</li><li>▪ Commodities Markets &amp; Trading (2)</li></ul>	<ul style="list-style-type: none"><li>▪ Production / Reservoir Engineering (1)</li><li>▪ Refining (2)</li></ul>
<b>Quantitative Tools</b>	<ul style="list-style-type: none"><li>▪ Efficiency Analysis (1)</li><li>▪ Industrial Optimization (2)</li><li>▪ Advanced Econometrics (2)</li></ul>	

**(1): Spring Term (2): Summer Term**



## **1.5. PROGRAM CONTENT**

### **► BUSINESS & MANAGEMENT**

#### **GENERAL OBJECTIVES**

On completion of the relevant teaching units, students will be capable of handling the main management, commercial and financial tools used in business, and of applying them in an overall manner. In simple situations they will be able to assess the financial position of a company, to draw up a marketing policy, to prepare investment decisions and to carry out an economic analysis applied to the energy sector. They will feel more comfortable to deal with complexity and change.

#### **GENERAL CONTENT**

- Business Accounting and Financial Analysis
- Teamwork across cultures
- Negotiation and Communication
- Strategy of the companies
- Marketing

### **► OIL AND GAS ECONOMICS & TECHNIQUES**

#### **GENERAL OBJECTIVES**

On completion of the relevant teaching units, students will be capable of:

- analyzing the geopolitical characteristics of the Energy industry
- describing the main economic characteristics of the different oil and gas activities
- building their own model of investment analysis including the influence of technical parameters
- communicating and working with specialists in petroleum technologies.
- performing a technical study in simple cases

#### **GENERAL CONTENT**

- Energy Economics and Energy Geopolitics
- Upstream Management and Portfolio Management
- Production and Reservoir Engineering
- Refining Techniques and Management, petrochemicals
- Gas, Power, Coal and Renewable
- Oil and petroleum products Trading and Hedging Techniques

### **► QUANTITATIVE TOOLS**

#### **GENERAL OBJECTIVES**

On completion of the relevant teaching units, students will be capable of performing quantitative analyses of the energy sector.

#### **GENERAL CONTENT**

- Statistical approaches for measuring and inferring about the economic performances of firms.
- Linear programming theory and applications
- Econometric models in energy economics and finance.

## 1.6. LIST OF TEACHING UNITS

### CREDITS AND TEACHING UNITS REQUIRED

- You need to take at least **24 US credits - 40 ECTS during the Spring and Summer Terms**. A 4-month internship in a company will add 20 ECTS and a Term in a Partner University 20 ECTS
- Compulsory teaching units **for every student: PEM 4, PEM 5, PEM 6, PEM 7 and PEM 8** (13 US credits or 20 ECTS)
- Compulsory teaching units for the students with **TAMU: PEM 9A+9B and PEM 10** (6 US credits or 9 ECTS),
- Compulsory teaching units for the students with **CSM: PEM 13**
- Research paper: report of 15-20 pages (1 US credit) if you need 1 US credit to complete your 24 US credits.

The following table gives the list of the teaching units with the title, ECTS credits and US credits allocated, name of the coordinator and the type of grading exams.

Teaching Unit	T	Hours	US/ECTS	Coordinator	For Grading
<b>Business and Management</b>					
PEM 1: Business Accounting	1	56	3 - 5	S. Koskas	2 Tests + Exam
PEM 2: Organizational Behavior	1	47	2 - 3	N. Bret-Rouzaut	Research Paper
PEM 3: Strategic Marketing & Management	2	33	2 - 3	J. Smith	Project + exam
<b>Oil and Gas</b>					
PEM 4: Energy Economics & Development	1 + 2	44+6	2 - 3	O. Massol	Paper + Presentation
PEM 5: Energy Geopolitics	1	66	2 - 3	J.P. Favennec	Presentation + Test
PEM 6: Upstream Management	1	36	3 - 5	N. Bret-Rouzaut	Paper + Case-study +
PEM 7: Downstream Management	2	62	4 - 6	E. Hache	Exam + quizz
PEM 8: Commodities Markets & Trading	2	36	2 - 3	E. Hache	Exam + Papers
PEM 9A&B: Reservoir Engineering	1	48+45	4 - 6	G. Lesage	2 Tests + 2 Projects
PEM 10: Refining	2	37	2 - 3	C. Le Mirronet	Exam
<b>Quantitative Tools</b>					
PEM 11: Efficiency Analysis	1	31	2 - 3	L. Simar	Report + Presentation
PEM 12: Linear Programming	2	17	1 - 2	F. Lantz	Exam
PEM 13: Advanced Econometrics	2	42	2 - 3	F. Lantz	Project + Exam
<b>Research Paper</b>	1		1 - 1	O. Massol	Report

<b>Degree</b>	<b>Spring and Summer terms</b>	<b>Term with a Partner University</b>	<b>4-month Internship</b>	<b>Number of ECTS</b>
<b>IFP Degree (Ing.)</b>	40	20	with experience	60
<b>IFP degree (Ing.) without experience/DNM</b>	40	20	20	80
<b>IFP degree (Ing.) without exp. (bac+4 césure) /DNM</b>	40	20	22 with 6-month internship	90
<b>IFP (Ing./DNM)+ Partner Degrees</b>	40	40	with experience (Ing.)	80
<b>IFP (Ing. Without experience)+ Partner Degrees</b>	40	40	20	100

## **1.7. HANDOUTS**

Handouts are given to the students for each course. For some courses, a textbook will be available for each student during the Term (to be given back at the end of the course). In addition, we have mentioned in the descriptive sheet of each course the corresponding reference books.

## **1.8. MAIN PARTNERS**

- BCJK
- BP
- BRUNEL UNIVERSITY
- CAISSE DES DEPOTS ET CONSIGNATIONS (CDC)
- CATHOLIC UNIVERSITY OF LOUVAIN-LA-NEUVE
- CENTRE FOR GLOBAL ENERGY STUDIES (CGES)
- ESCP-EAP
- EDF
- ERNST&YOUNG
- GAZ de FRANCE
- GWA ASSOCIATES
- IFP
- LOGICIA
- OXFORD INSTITUTE
- PARIS DAUPHINE UNIVERSITY
- PRAXEOS MANAGEMENT
- PRINCEPS
- RENNES INTERNATIONAL SCHOOL OF BUSINESS
- SHELL
- TOTAL
- UNITED NATIONS
- UNIVERSITY OF BRADFORD
- UNIVERSITY OF DUNDEE
- UNIVERSITY OF GRENOBLE (LEPII-EPE)

## **1.9. BUSINESS SKILLS CENTER (BSC)**

The Business skills centre (BSC) organises courses and workshops that students may enrol in voluntarily. Once enrolled, attendance at the course is obligatory. The aim of the BSC is to:

- offer more targeted and detailed non-technical courses
- prepare the students for the transition into their professional career
- promote the interaction between students enrolled in different programs at the school

Courses offered are based around the following themes:

- job hunting
- personal development and self-knowledge

An overview of the BSC courses and workshops is presented to the students at the beginning of each IFP School program. Courses are held throughout the school year in evenings after 5pm and every second Wednesday afternoon.

For more information, please contact the BSC coordinators as follows:

Teaching/course content:

Nadine Bret-Rouzaut, Director of the Center for Economics and Management

Organization: Sophia Chorazewiez, Student and Alumni Liaison Officer

Catherine Cloarec, Secretary, Centre for Exploration - Production

## **2. OUTLINE OF TEACHING UNITS**

## PEM

### **Teaching Unit PEM 1**

### **BUSINESS ACCOUNTING**

**Coordinator: Sylvain KOSKAS**

#### **OBJECTIVES**

The course starts with a pre-requisite course, compulsory for the students from Gubkin University and advised for the other students focusing on the main accounting records: Balance Sheet, Profit & Loss account and Notes.

On completion of the PEM1 course, students will be able to explain the main accounting principles in the financial statements of a company, to analyze them in terms of profitability, solvency and financial structure, to draw up and use a statement of cash flows and to learn how to make forecasts both in short term and long term.

#### **LECTURER**

<b>Course</b>	<b>Lecturer</b>	<b>Company</b>	<b>Hours</b>	<b>Term</b>
Prerequisite Course	Sylvain KOSKAS	Certified Public Accountant Management Consultant, and External Auditor	12 41	Spring

#### **TOTAL HOURS IN CLASS: 56**

- **Prerequisite course** = 12 hours
- **Lectures**, 12 x 3 h = 36 hours
- **2 Reviews**, from 8 to 9 am = 2 hours
- **2 Tests**, 2 hours (part of a lecture)
- **1 Exam** = 3 hours.

This course is demanding: intensive listening during lecture and homework between each course (notes to review and exercises to prepare).

**CREDITS US: 3**

**CREDITS ECTS: 5**

#### **TRAINING TECHNIQUES**

Lectures by an Expert with many Applications.

## **TEXTBOOK**

- "Introduction to Accounting", Sylvain Koskas, 2006.
- "Financial Management", A. and S. Koskas, 2006.
- "Cost Accounting", Horngren/Foster/Dasew - Prentice Hall.

## **GRADING CRITERIA**

- 2 Tests, closed books, 1 hour each, 2 x 20 % : 40% of the grade.
- 1 Exam (3 hours), open books : 60 % of the grade.

## **OUTLINE**

- Balance Sheet, Income Statement and Notes
- The generally accepted accounting principles (GAAP); case of oil and gas companies, I.F.R.S. and FASB
- Consolidated Accounts
- Financial Analysis: financial equilibrium and profitability, working capital, operating working capital, cash position
- Statement of Cash Flows
- Stock Exchange, Market Value, Price Earning Ratio
- Financing Plan
- Cash Flow Planning
- Introduction to cost accounting and management control.

**Teaching Unit PEM 2**  
**ORGANIZATIONAL BEHAVIOR**  
**Coordinator: Nadine BRET-ROUZAUT**

**OBJECTIVES**

The general objectives of this course are to enable the students to:

- understand differences in the values, perceptions and behaviour patterns of actors in the international business environment
- be in a position to adjust to these differences in such a way that it will enhance exchange(s) between actors
- acquire aptitudes and skills for working efficiently both within the corporate environment and externally
- develop empathetic skills in an international context
- understand and respond successfully to the different approaches in international business exchanges

**LECTURERS**

<b>Course</b>	<b>Lecturers</b>	<b>Company</b>	<b>Hours</b>	<b>Term</b>
Managing Cultural Diversity	Alan DARRICOTE	Rennes International School of Business	30	Spring
International Negotiation	Marc BERETTA	Inis Alga	12	
MBTI: Optional	Nicole PARENT	Praxeos management	4	
Communication Techniques	Nadine BRET-ROUZAUT	IFP School	1	

**TOTAL HOURS IN CLASS:** 47

MBTI Test with the Business Skills Center

**CREDITS US:** 2

**CREDITS ECTS:** 3

**TRAINING TECHNIQUES**

Lectures, case-studies, readings and pre-readings, recorded material, participant input, open discussion and simulations.

**TEXTBOOK :** IFP School Handouts

**BIBLIOGRAPHY**

Buelens, M. Kreitner, R., Kinicki, A., **ORGANIZATIONAL BEHAVIOR**, 3<sup>rd</sup> European Edition. McGraw Hill, London, 2004. *The target of this book is European students, and most examples are European.*

Nahavandi, A. and Malekzadeh, A. **ORGANIZATIONAL BEHAVIOR: The Person-Organization Fit.** Prentice Hall, Upper Saddle River, NJ, 1999.

Robbins, S. **OB: CONCEPTS, CONTROVERSIES, APPLICATIONS** (11th Edition). Prentice Hall, Upper Saddle River, NJ, 2005

Francesco, A. M. and Gold, B. A. **INTERNATIONAL OB: Text, Readings, Cases, and Skills** (2<sup>nd</sup> edition), Prentice Hall, 2004.

Greenberg, Jerald. **MANAGING BEHAVIOR IN ORGANIZATIONS.** Prentice Hall, 2004.

Lane H. and Distefano, J., Maznevski, M., **INTERNATIONAL MANAGEMENT BEHAVIOR**, Blackwell Publishing, 2005.



Mainiero, L. and Tromley, C. **DEVELOPING MANAGERIAL SKILLS IN OB** (4<sup>th</sup> Edition). Prentice Hall, Englewood Cliffs, NJ, 1994  
Harris and Moran (any edition) **MANAGING CULTURAL DIFFERENCES** – Gulf Publishing Company  
Lewis D. (any edition) **WHEN CULTURES COLLIDE** – Nicolas Brealy  
Mole J (any edition) **MIND YOUR MANNERS** – Nicolas Brealy  
Trompenaars F (any edition) **RIDING THE WAVES OF CULTURE** - Nicolas Brealy  
Victor D (any edition) **INTERNATIONAL BUSINESS COMMUNICATION** – Harper

***NB** These are general reference books dealing with the subject area discussed during the course, but if you have a specific interest then don't hesitate to contact your instructor and he will try and point you to sources that will be useful to you.*

**GRADING CRITERIA:** Assessment will be of two types.

**FORMATIVE ASSESSMENT** – Compulsory pre-reading will be given one week before each session. A quiz type evaluation designed to test the understanding of the text(s) will be given at the start of discussion on each topic.

In general, there will be one quiz at the beginning of the morning session and one at the beginning of the afternoon session. The results will count towards the final mark awarded.

**SUMMATIVE ASSESSMENT** - A list of suggested topics for an individual research project will be given to participants at the beginning of the course along with the requirements which must be satisfied in order to pass this course. Participants are free to suggest other subjects for their projects with their instructor

## **OUTLINE**

### **Organizational Behavior**

Day 1

Introduction to the course : issues to be dealt with, objectives, teaching approach, student input, evaluation. Global overview of OB including global implications . Strategies and tactics of communication within the organization. Exercise: Daimler-Chrysler

Day 2:

Student Journal feedback. Group dynamics and Conflict Management. Leadership: how to develop it. Exercise: Merger Game

Day 3

Student Journal feedback. Cultural diversity and its impact on OB. Selection and recruitment in the international environment. Case: Business Week Interactive Case

Day 4:

Student Journal feedback. Training and development - its uses and misuses.. Motivation - a practical view. Exercise: International Sales

Day 5:

Student Journal feedback. Self-management within the workplace. Ethics and their role in current management strategies. Group Presentations

### **International Business Negotiation**

The objective is to learn how to become a more effective negotiator. We will start by the preparation process of a negotiation, which is a key issue. Then, we will spend time on the meeting itself, focusing on the process, the techniques and, of course the appropriate behaviour. Then, we will see what makes an international negotiation different. Finally, the follow up.

**Teaching Unit PEM 3**  
**STRATEGIC MARKETING & MANAGEMENT**

**Coordinator: Jamie SMITH**

**OBJECTIVES**

This course provides the essential elements of strategic marketing and Management within the context of the Oil, Gas, and Motor industries. Value creation through the marketing functions (Segmentation, Targeting, Positioning, Brand Management, and Customer Relationship Management) is the main emphasis. The goal is to go beyond the traditional Marketing Mix and explore the Valued Customer, the Value Network and the Value Proposition.

**LECTURERS**

Course	Lecturers	Company	Hours	Term
Marketing	Jamie SMITH	Rennes International School of Business	18	Summer
Marketing of Oil Products	Experts	BP	6	

**TOTAL HOURS IN CLASS: 27**

- **3-day Simulation**, 18 hours
  - **Lectures with Assignments**, 6x3 hours, 18 hours
  - **Exam**, 3 hours
  
- **Lectures**, 8 x 3h = 24 hours
- **1 exam**, 3 hours

**CREDITS US: 2**

**CREDITS ECTS: 3**

**TRAINING TECHNIQUES**

In addition to classroom lectures, readings, case studies, and videos, there will be a ‘workshop’ approach to applying and using strategic marketing tools and models.

**TEXTBOOK**

- IFP School Handouts.
- Kotler, P. Marketing Management, 11<sup>th</sup> Ed., International Edition, Prentice-Hall, 2003.
- Cravens and Piercy, Strategic Marketing, 7<sup>th</sup> Edition, McGraw Hill, 2003

**GRADING CRITERIA**

- Courses: 60% of the grade.
  - **Continuous assessment** 50%
  - **quiz: 10% + class activities: 20% + group assignments: 20%**

- **Final Exam** 50%  
A case study will be the basis of the final exam (application of course concepts).
- **Logicia simulation:** 40% of the grade.

## **OUTLINE**

### **Strategic Management Simulation (3 days)**

A strategy is the pattern that integrates an organization's major goals, policies, and actions into a cohesive whole. A well-formulated strategy helps to marshal and allocate resources into a unique and viable attitude based on the organization capabilities, competitive environment, dynamics of change and contingent opponent's moves.

- A computer simulation, using SIMASTRAT software, for a decision-making exercise in a competitive environment.
- Intensive team work and strong personal implication.
- Immediate feedback on team decisions and performance.
- Final debriefing: preparation and presentation of a business report to a Board of directors.

PEM  
**Teaching Unit PEM 4**  
**ENERGY ECONOMICS & DEVELOPMENT**  
**Coordinator : Olivier Massol**

**OBJECTIVES**

At the end of the course, the participants will:

- have a broad view of the main economics debates related to the Energy Industry during the 19's century
- have an understanding of the evolution of energy concepts and the relationship between economics, development and energy thorough the modern history
- get a good knowledge of the fundamentals of energy policies and an understanding of policy versus market

**LECTURERS**

<b>Course</b>	<b>Lecturers</b>	<b>Company</b>	<b>Hours</b>	<b>Term</b>
Discussion Paper	Emmanuel HACHE and Olivier MASSOL	IFP-SCHOOL	24	Spring & Summer
Lectures	Paul STEVENS	UNIVERSITY OF DUNDEE	6	

**TOTAL HOURS IN CLASS:** 30

- Lectures with Assignments, 10x3 hours, 30 hours

**CREDITS US:** 2

**CREDITS ECTS:** 3

**TRAINING TECHNIQUES**

In addition to classroom lectures and readings, the students will have to choose one of the 46 articles contained in Paul Stevens's book to present to the class.

**The Economics Of Energy, Paul Stevens (Editor), Edward Elgar Publishing**

This volume contains 46 articles on the economics of energy, dating from 1931 to 1996.

Table of Contents

Oil and Economic Performance in Industrial Countries

Business Cycles and the Oil Market

Framework for Analysing the Implications of the Rise in Oil Prices

Natural Resources and the Macroeconomy: A Theoretical Framework

Demand Side Issues

Historical Relations Between Energy and Economic Growth

Economic Growth and Energy Consumption in the UK, 1700-1975

Reassessing Energy Intensities: A Quest for New Realism  
 The Economic Analysis of Energy Demand: Perspectives of a Practitioner  
 Energy Demand Analysis in Developing Countries: A Review  
 Lifecycle Analysis of Gasoline Expenditure Patterns  
 Economies of Scale in Energy Use in Adult-Only Households  
 Energy Policy, Merit Goods, and Social Security  
 Conservation  
 Energy Conservation Policy in Developing Countries: The Case for Market Solutions  
 Discount Rates in Consumers' Energy-Related Decisions: A Review of the Literature  
 Energy Conservation Investment: Do Consumers Discount the Future Correctly?  
 Do Consumers Discount the Future Correctly? A Market-Based Valuation of Residential Fuel  
 Switching  
 Barriers to Improvements in Energy Efficiency  
 Vehicle Use and Fuel Economy: How Big is the "Rebound" Effect?  
 Modelling  
 The Allocation of Energy Resources  
 Applied General Equilibrium Models for Energy Studies: A Survey  
 Models of the Oil Market Revisited

## GRADING CRITERIA

- Discussion Paper **Oral Presentation** : 50 % of the grade.
- **Research Paper** : 50 % of the grade.

## BIBLIOGRAPHY

- Carol A. Dahl, International Energy Markets, Tulsa, Okla., 2003, Penn Well
- Leonardo Maugeri, The Age of Oil. London 2007, The Lyons Press
- Øystein Noreng. Crude Power, London 2005, I.B. Tauris
- Vaclav Smil, Energy at the Crossroads, London 2003, The MIT Press
- Vaclav Smil, Energy in Nature and Society, London 2008, the MIT Press
- Oil and the Future of Energy: Climate Repair \* Hydrogen \* Nuclear Fuel \* Renewable and Green Sources \* Energy Efficiency, London 2007, The Lyons Press
- Jan-Hein Jesse and Coby van der Linde, Oil Turbulence in the next decade, The Hague 2008, Clingendael International Energy Programme  
[http://www.clingendael.nl/publications/2008/20080700\\_ciep\\_energy\\_jesse.pdf](http://www.clingendael.nl/publications/2008/20080700_ciep_energy_jesse.pdf)
- John Mitchell, ed., The New Economy of Oil, London 2001, Royal Institute of International Affairs
- Griffin & Teece (1982) "Elements of the Crude Oil Production Decision: Implication from Economic Theory" and "Models of OPEC behavior" in OPEC Behavior and World Oil Prices, George Allen & Unwin, page 13-35. The rest of the book for depth.
- Dohner, R.S. (1981): "Energy Prices, Economic Activity, and Inflation: A Survey of Issues and Results" in K.A. Mork (ed.) Energy Prices , Inflation and Economic Activity, Ballinger Publishing Company.

PEM

**Teaching Unit PEM 5**  
**ENERGY GEOPOLITICS**

**Coordinator: Jean-Pierre FAVENNEC**

**OBJECTIVES**

At the end of the course, the participants will:

- have a broad view of the main geopolitical characteristics of the Energy Industry (relationships between importing and exporting countries; competition between exporting countries; the place and role of OPEC), the development of this industry and the constraints (like energy consumption and reserves ) associated with the various energies
- have an understanding of the evolution of energy prices
- will be able to describe the main characteristics of the regions studied in terms of order of magnitude and key ideas.

**COURSES**

<b>Lecturers</b>	<b>Company</b>	<b>Hours</b>	<b>Term</b>
Jean-Pierre FAVENNEC	IFP School	30	Spring
Robert MABRO	Consultant	6	

**TOTAL HOURS IN CLASS: 50**

- **Lectures + Presentations:** 42 hours
- **1 test,** 2 hours
- **International Energy Agency** visit, 0,5 day
- **International Oil Summit** in Paris, 1 day.

**CREDITS US : 2**

**CREDITS ECTS : 3**

**TRAINING TECHNIQUES**

Lectures given by Experts.

## **TEXTBOOK**

- IFP School Handouts

## **BIBLIOGRAPHY**

- "The Prize: the epic quest for oil, money and power", Daniel Yergin
- "The Paradox of Plenty - Oil Booms and Petro-States", Terry Lynn Karl, 1997
- "Energy Scenarios 2020 for European Union", P. Capros and al
- The World Bank Atlas, OCDE Economic Reports, Congress of the World Energy Council
- "Out of gas: the end of the age of oil" David L. Goodstein
- "The Oil Factor: protect yourself - and profits - from the coming energy crisis" Stephen Leeb
- "End of Oil" Paul C. Roberts
- "The Party's Over: Oil, War and the fate of industrial societies" Richard Heinberg
- "Crude Power", London 2005, I.B. Tauris, Øystein Noreng

## **GRADING CRITERIA**

- 1 **Research Paper** (15-20 pages) with Oral Presentation : 50% of the grade.
- 1 **Test** (without document) based on the executive summaries of the reports : 50% of the grade.

## **OUTLINE**

Energy economics

Energy production and consumption. Present situation. Forecasts. Energy reserve.

Energy prices. Evolution of the oil industry. Oil Prices. Discussion : Oil prices in 2015

The players on the energy scene ; OPEC, oil companies, consuming countries

Energy Policy objectives

WTO and Trade Negotiations

Energy geopolitics in America (North and South)

Presentations: Situation in North America (NAFTA) + situation in South America

Energy geopolitics in Europe. The role of Russia. The role of Africa

Presentations: Situation in Europe + situation in CIS

Energy geopolitics in the Middle East and Asia

Presentations: Situation in the Middle East + situation in Asia.

Energy security.

Presentations: The US case + the European case.

Energy industrial organisation, energy markets, energy prices.

Presentations: Organisation in the oil and gas sector .

PEM  
**Teaching Unit PEM 6**  
**UPSTREAM MANAGEMENT**

**Coordinator : Nadine BRET-ROUZAUT**

**OBJECTIVES**

At the end of the course the students will :

- get an understanding of the economics of the Upstream sector in all its aspects: reserves, players (IOC, NOC, Contractors), investments, costs, benchmarking, etc.
- get a practice of calculation of the taxes in a royalty system or PSC
- gain a basic understanding of the different strategies applied in the upstream business
- gain a good practice of the standard methods of investment analysis
- be able to build their own model and use a model acquired by a company of upstream investment analysis taking into account fiscal aspects, inflation, financing mix and risk to take a decision related to the development of an oil field
- gain an experience in E&P decision evaluation techniques when risk has to be coped with.

**LECTURERS**

Course	Lecturers	Company	Hours	Term
Upstream Economics	Nadine BRET-ROUZAUT	IFP School	12	Spring
Case-Study	Nadine BRET-ROUZAUT	IFP School	21	
Portofolio	Bernard DUVAL	IFP School	18	
Management	Emmanuel MORIN	Total	12	
Capital Budgeting	Anton MELARD DE	Ernst&Young	6	
Taxation	FEUARDENT / Bruno VIBERT			

**TOTAL HOURS IN CLASS:** 66

- **Lectures**, 42 hours
- **Case-study**, 15 hours computer classroom + analysis/writing of the report 6 hours = 21 hours
- 1 **Paper**, 1 **Quiz** Upstream Economics, 1 hour; 1 **Exam** Portofolio Management, 3 hours = 4 hours

**CREDITS US:** 3

**CREDITS ECTS:** 5

**TRAINING TECHNIQUES**

Lectures by Experts, Applications and Case-study.

**TEXTBOOK**

IFP School Handouts

- "Oil and Gas Exploration and Production", Editions Technip



## **BIBLIOGRAPHY**

- "Oil: a practical guide to the Economics of World Petroleum", Peter Ellis Jones, 1988.
- "International Petroleum fiscal Systems & PSC", Daniel Johnston, PennWell, 1994.
- "Fundamentals of oil & Gas Accounting", R. Gallun, C. Wright, L. Nichols, J. Stevenson, PennWell, 2001.
- "International Oil Company Financial Management in non technical language", D. Johnston & J. Bush, PennWell, 1998.
- "Oil Company Financial analysis in non technical language", D. Johnston, PennWell, 1992.
- "Risk assessment & decision making in business & industry: a practical guide", Glenn Koller, CRC Press, 1999.
- "Risk Modeling for determining value & decision making", Glenn Koller, CRC Press, 2000.
- "Valuing oil & gas companies", N. Antill & R. Arnott, Woodhead Publishing Limited.
- "Economics of Worldwide Petroleum Production", R. Seba, OGC Publications
- "Economic risk in hydrocarbon exploration", I. Lerche, J. MacKay, Academic Press
- "The business of Petroleum Exploration" AAPG, edited by R. Steinmetz

## **GRADING CRITERIA**

- **2-page Paper** in Upstream Economics : 20 % of the grade.
- Capital Budgeting **Case-Study** with written report : 20 % of the grade.
- **Test** Petroleum Economics : 30 % of the grade.
- **Exam** Portofolio Management : 30 % of the grade.

## **OUTLINE**

### **Upstream Economics (2 days)**

- Key figures in upstream, the main challenges, players: IOC, NOC, Independents, Contractors
- Oil Reserves
- Investments and Costs. Accounting and Performance Measures: investments and costs, finding & development costs, booked reserves, etc.
- Legal and Fiscal aspects: concession - royalty system / production sharing contracts / service contracts with many exercises and spreadsheets.

### **Capital Budgeting (2 days + 3.5-day Case-study)**

- Introduction: cash flow schedule / discount rate.
- Criteria: net present value (NPV) / internal rate of return (IRR) / pay out time.
- Fiscal impact: depreciation rate and profitability / after tax NPV, IRR.
- Taking inflation into account: current money/constant money.
- Investment and financing mix: overall and equity return and capital rationing.
- Shallow interest method.

### **Strategies/ Portofolio Management (3 days)**

- Upstream strategies, future trends: "frontiers", technology, gas specificity.
- Project evaluation and decision-making. Risk assessment. Case-history.
- Summary of petroleum systems and risk qualifiers.
- Use of lognormality in dealing with natural parameters.
- Field size distributions.
- Prospect and play analysis. Reserve estimation.
- Portofolio inventories.
- Tools of choice for ranking and selection.
- Performances versus predictions. Performance improvement.

PEM

## Teaching Unit PEM 7

### DOWNSTREAM MANAGEMENT & SUSTAINABLE DEVELOPEMENT

Coordinator: Emmanuel HACHE

**CREDITS US:** 4

**CREDITS ECTS:** 6

## Teaching Unit PEM 7A

### REFINING AND PETROCHEMICAL INDUSTRIES

Coordinator: Jean-Pierre FAVENNEC

#### OBJECTIVES

The objectives of this course are to:

- understand the main economic characteristics of the refining and petrochemical industries and the economic mechanisms of refining operations, with the concepts of refining margins and volatility
- be able to write a LP model and analyze the optimal solution and validity limits and use an industrial software to optimize the operations of a conversion refinery.

#### LECTURERS

Course	Lecturers	Company	Hours	Term
Refining	Jean-Pierre FAVENNEC	IFP School	6	Summer
Petrochemistry	Christian LESNE	Consultant	6	
Project	Victor GORDILLO	Princeps	18	
BP			6	

**TOTAL HOURS IN CLASS:** 36

**Lectures:** 18 h

**Projects:** 18 h

#### TRAINING TECHNIQUES

Lectures given by Experts

Projects

**TEXTBOOK :** IFP School Handouts.

## **GRADING CRITERIA**

- See PEM 7B

## **OUTLINE**

### **Refining Overview and Economics (1 day)**

- Flexibility/limitations - current refining context - refining costs.
- Refining margins: various margins according to crude oil choice, complexity, location, etc.
- Costs versus margins – Profitability of the refining industry.
- Constraints: products slate evolution, environmental constraints, products qualities.
- Integrated companies versus independents.

### **Refining Business with BP (1 day)**

#### **Petrochemicals (1 day)**

- Overview of the petrochemical industry: end products (plastics, fibers, synthetic rubber), intermediate products, building blocks
- Economics of the petrochemical industry

### **Project: Refining Project (3 days)**

This project shows students how to use an industrial computer software to optimize the operations of a conversion refinery.

Each working group of three or four students has to run and analyze two standard annual production plans for a typical refinery before optimizing its own production plan. Common to all the working groups, the first two plans are set up to familiarize students with the LP refining model (input data and output results) and the softwares (LP matrix generator and the optimization software). Then, each working group has to build its own case, by modifying the crude oil supply, the process unit availability and the oil product demands, and to optimize it by selling and/or purchasing some oil products.

- Refinery modeling (material balances, product specifications, utilities consumption, etc.).
- Writing of a LP model and Optimization (using a computer optimization software).
- Analysis of the optimal solution and validity limits.
- Overview of other applications : transportation and multiperiod modeling, oil industry planning.

**Teaching Unit PEM 7B**  
**DOWNSTREAM ECONOMICS: GAS, POWER, COAL, RENEWABLES,**  
**ENVIRONMENT**

**Coordinator: Emmanuel HACHE**

**OBJECTIVES**

The objectives of this course are to:

- review the economics of oil products transportation and distribution
- get an overview of the natural gas chain and an understanding of gas market structures and its fundamental characteristics, costs, contracts and pricing, both upstream and downstream
- evaluate the issue of electricity production and distribution
- get a general knowledge of the regulation of pollution control

**LECTURERS**

<b>Course</b>	<b>Lecturer</b>	<b>Company</b>	<b>Hours</b>	<b>Term</b>
Industrial Economics	Olivier MASSOL	IFP School	12	Summer
Commodities	Emmanuel HACHE	IFP School	3	
Gas	Ezekiel BOYER	Gaz de France	12	
Electricity	Marc TROTIGNON	EDF	9	
Coal	Sylvie CORNOT	ATIC	3	
CO2	Benoit LEGUET	CDC	3	
Environment	Roger RAUFER	Consultant	9	
Electricity Project	Frederic LANTZ/ Lesya NADZON	IFP School	9	

**TOTAL HOURS IN CLASS:** 62 h

**Lectures:** 42 h

**Presentations:** 12 h

**Exam:** 2 h

**TRAINING TECHNIQUES**

Lectures given by Experts

Projects

**TEXTBOOK :** IFP School Handouts.

**GRADING CRITERIA 7A + 7B**

- **Refining Project:** 20% of the grade.
- **Electricity Project :** 15% of the grade.
- **Research paper with presentation:** 25% of the grade.
- **Exam:** 40% of the grade.

## **OUTLINE**

### **Gas**

1. Natural gas industry fundamentals.
  - Production, processing, liquefaction, storage, transportation and distribution.
  - Costs and comparison between oil chain and gas chain.
  - Reserves, production, consumption, exports and demand.
2. Natural gas market structure.
  - historical development of various natural gas networks.
  - Gas monopolies in emerging markets and liberalization in mature markets.
3. Natural gas marketing.
  - Netback pricing and upstream natural gas contracts (take-or-pay).
  - Emergence of spot markets, price risk, and futures markets.
  - Basic principles of downstream gas pricing.
4. LNG.
  - Technical principles. and Economics of LNG.

### **Gas Electricity Convergence**

#### **Electricity**

- Electricity generation.
- Production / Transportation / Distribution.
- Deregulation of the industry.

#### **Environment**

- Regulation of pollution control.
- Economic incentives (types, marketable permits, etc.).
- Environmental modeling and monitoring and database management.

#### **Coal**

- Coal Industry fundamentals.
- Production/transportation

#### **Renewables**

- Renewable Industry fundamentals.

**Teaching Unit PEM 8**

**COMMODITIES MARKETS & TRADING**

**Coordinator: Emmanuel HACHE**

**OBJECTIVES**

On completion of the course, students will be able to:

- identify and analyze the price risk involved in a petroleum product negotiation operation.
- implement a hedging strategy in accordance with the nature of the risk understand the evolution of a market and the new risks that accompanies it.
- understand the mechanics and operations of a derivatives exchange.
- recognize the uses of futures and options for trading and risk management purposes throughout the energy market.
- get an awareness of the difference between OTC and exchange traded derivatives.

**LECTURERS**

<b>Course</b>	<b>Lecturer</b>	<b>Company</b>	<b>Hours</b>	<b>Term</b>
Price formation	Emmanuel HACHE	IFP	6	Summer
Trading (1)			6	
Trading (2)	Graham WRIGHT	GWA Associates	15	
	Experts	BP	6	

**TOTAL HOURS IN CLASS:38**

- **Lectures**, 36 hours
- **1 exam**, 2 hours

**CREDITS US: 2**

**CREDITS ECTS: 3**

**TRAINING TECHNIQUES**

Lectures given by Experts.

**TEXTBOOK**

- IFP School. Handouts.

## **GRADING CRITERIA**

- 1 exam : 40 % of the grade.
- **Research Paper** : 30 % of the grade.
- **Commodity Paper** : 30 % of the grade.

## **OUTLINE**

### **Basics Of Markets**

- Introduction to markets.
- OTC products, physical vs. cash settlement.
- The trading game, starting by OTC transactions, fair value, price, bid-offer, liquidity, settlement, credit risk, market risk, P&L, MTM, Principles of Hedging, etc.
- The trading game in the afternoon.

### **Oil Markets**

- Introduction to physical oil markets.
- Introduction to futures markets - basics of options.

### **Hedging**

- Applied concepts.
- Sophisticated strategies built on futures and options combinations.
- The difficulty involved in implementing an optimum hedging strategy through the mix of different risk management tools.
- Trading and hedging using IPE options.
- Computer simulation.

### **Risk Management**

- Building blocks of risk management.
- Risk management on a more general framework. measuring and hedging risks (directional, interest rate risk, volatility,...) directional, interest rate, volatility, credit, legal risks. big focus on understanding risks and hedging them. options game.

### **Oil Trader (crude oil and products)**

- Applied and practical aspects of oil trading.

### **Logistics And Transportation**

- Oil products transportation by pipelines / by rail / by trucks / by ships.
- Storage of oil products – Optimization.
- Shipping operations.

PEM  
**Teaching Unit PEM 9A and PEM 9B**  
**PRODUCTION AND RESERVOIR ENGINEERING**

**Coordinator: Gérard LESAGE**

**OBJECTIVES**

The objective of the course is to introduce participants to the basic techniques used in exploration and production so they will be able to communicate with specialists in this field and understand and estimate the validity of the technical data on which economic analyses are based.

At the end of the first part, the students are able to :

- Trigger data acquisition, to participate to the treatment and to the interpretation of the data which help first characterize a reservoir.
- Identify the uncertainties attached to these data.
- Evaluate the oil and gas accumulations.

At the end of the second part the students are able to:

- Identify the drainage mechanisms occurring in a reservoir, to recommend a secondary recovery process, to evaluate the reserves under different options.
- Elaborate development and exploitation scenarii with their production profiles, knowing how to evaluate the field initial production potential, to evaluate the number of wells to be drilled , to recommend a secondary process if needed and/or an artificial lift.

**LECTURERS**

<b>Lecturers</b>	<b>Company</b>	<b>Hours</b>	<b>Term</b>
J. BESSON	Consultant	3	Spring
S. BOYER	IFP School	3	
A. COUTURIER	IFP School	6	
A. DOAT	Total	6	
P. DONNEZ	Consultant	15	
P. EGERMANN	IFP	3	
N. HENN	Gaz de France	6	
A.C. HUSER-MARTINIE	Total	6	
Y. LE GALLO	IFP	3	
G. LESAGE	Consultant	6	

**TOTAL HOURS IN CLASS: 93 hours**

9A (beginners): 42 hours + **1 visit** (Technip) 1 day

9B (advanced): 45 hours

<ul style="list-style-type: none"> <li>▪ Lectures</li> <li>▪ <b>1 test, 3 hours</b></li> <li>▪ <b>1 review, 3 hours</b></li> <li>▪ <b>1 project, 9 hours</b></li> </ul>	<ul style="list-style-type: none"> <li>▪ Lectures</li> <li>▪ <b>1 test, 3 hours</b></li> <li>▪ <b>1 review, 3 hours</b></li> <li>▪ <b>1 project, 9 hours</b></li> </ul>
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**CREDITS US: 2 / CREDITS ECTS: 3**

**CREDITS US: 2 / CREDITS ECTS: 3**



## TRAINING TECHNIQUES

Lectures given by Experts and Projects.

## TEXTBOOK

- IFP School Handouts and "Reservoir Engineering" R. COSSE, Editions Technip, 1993.

## BIBLIOGRAPHY

- "Drilling", J.P. Nguyen, Editions Technip.
- "Well Completion and Services", D. Perrin, Editions Technip.
- "Integrated Reservoir Studies", L. Cosentino (for advanced).
- "Petroleum Production in non technical language", F.Gray, Editions Penwell.

## GRADING CRITERIA

- **2 Tests** (no documents)
- **2 Projects** carried out by teams and written reports will be issued; each team will present briefly (3/4 h) the field development project.  
**Grade: 25% for each Test and each Project.**

## OUTLINE

⇒ 9A

N° 1+2+3: **Mr Lesage (Coordinator) + MM Huser and Martinie:** Geology and geophysics. What is needed to make a reservoir, reservoir rocks, traps. Seismic elements

N° 4: **Mr Bekri (IFP):** Characterisation of a reservoir rock. Porosity, permeability, saturations and capillary properties, relative permeabilities

N°5: **Mr Couturier (IFP School):** Drilling

N°6: **Mr Henn (GdF):** Fluids and PVT studies. Pure substances, natural gases, oil and formation water properties

N°7: **Ms Boyer (IFP School):** Logging. Tools, principals. Quick look interpretation of well logs

N°8: **Mr Lesage :** Well testing. Objectives, test program. One phase fluid mechanics and well tests interpretation

N°9: **Mr Sitbon - Review**

N°10: **Test 1**

N°11: **Mr Henn (GdF):** Evaluation of oil and gas accumulations

N°12+13+14: **Mr Lesage (Coordinator) + Mr Donnez (Total)**

**Project - part 1**-Evaluation of the accumulation of an oil field

Data analysis : description of the reservoirs and the fluids ; evaluation of the accumulation and uncertainties

⇒ 9B

N°15: **Mr Couturier (IFP School):** Completion, artificial lift

N° 16+17+18+19+20: **Mr Donnez (Total):** Multiphases flow - Relative permeabilities - Primary recovery - Mechanisms, oil and gas material balance. Secondary and tertiary oil recovery - Water injection and gas injection (miscible and non miscible). Tertiary oil recovery : chemicals, polymer, steam

Reserves definition/Development methodology. Réserves P, 2P , 3P

N°21: **Mr Le Gallo (IFP): Modelling and Reservoir simulation**

N°22: **Mr Lesage (Coordinator) + Mr Besson (Consultant):** Computer applications ( MBAL)

N°23: **Mr Lesage - Review**

N°24+25: **Mr Doat (Total):** Surface production ( treatment facilities, onshore/offshore installations, costs )

N°26: **Test 2**

N°27+28+29

**Project - Part 2** - Field development of the project studied in part 1 (number of wells, production profile)

PEM  
**teaching Unit PEM 10**  
**REFINING**

**Coordinator: Carole LE MIRONET**

**OBJECTIVES**

At the end of the course, the students will be able to:

- describe the main characteristics of various crude oils and petroleum products
- explain the operating principles of refining processes
- analyze the technical impact of more stringent products specifications

**LECTURERS**

	<b>Lecturers</b>	<b>Company</b>	<b>Hours</b>	<b>Term</b>
Lectures	Gérard DEBERON	IFP Training	6	Summer
	Carole LE MIRONET	IFP-School	12	
	Bernard LERY	IFP-School	12	
Simulation	Philippe PIERRE	IFP Training	0.5	

**TOTAL HOURS IN CLASS:** 37 hours

- **Lectures**, 30 hours
- **Simulation**, 0.5 day
- **Exam**, 0.5 day
- **Visit**, 1 day

**CREDITS US:** 2

**CREDITS ECTS:** 3

**TRAINING TECHNIQUES**

Lectures given by Experts + Visit of a refinery.

**TEXTBOOK**

- IFP Training and IFP School Handouts.
- "Petroleum Refining for the non-technical person" Wiliam L. Leffler, Penwell.

## **GRADING CRITERIA**

- 1 Exam : 100 % of the grade.

## **OUTLINE**

### **Petroleum Products (1 day).**

For the main petroleum products (LPG, Gasoline, Jet Fuel, diesel Oil, Heating Oil, Fuel Oil, Lubricants, Bitumen, etc.), the course will develop the main characteristics and specifications, the fields of use, the development of consumption.

### **Crude Oil Fractionation Units / Distillation (2 days)**

- Crude oil fractionation units.
- Crude oil desalting, atmospheric distillation, gas and gasoline separation.
- Vacuum distillation of the atmospheric residue.
- Distillation on dynamic simulator.

### **Reforming, Isomerization, Hydrorefining & Hydrodesulfurization (1.25 days)**

- Catalytic reforming and isomerization: integration to catalytic reforming.
- Hydrorefining processes: impurities removal, place of the hydrotreating units in the refining scheme.
- Hydrodesulfurization of intermediate distillates, hydrotreating in new residue conversion schemes, scrubbing treatment (sulfur recovery processes and treatment of residual gases by Claus unit).

### **Conversion Units (1.75 days)**

- Conversion unit.
- Outline of conversion and various cracking processes.
- Characteristics and origin of feeds to be cracked.
- Conversion by thermal cracking : visbreaker, various cokers.
- Conversion by catalytic cracking : FCC and related units (alkylation, MTBE, ETBE...).
- Hydroconversion processes : hydrocracker and related units.
- Hydrogen production units.

### **Simulation (0.5 day)**

Simulation of refinery operations and products manufacturing using a spreadsheet. This project allows the students to understand both the technical and economical aspects of refining operations.

PEM  
**Teaching Unit PEM 11**  
**EFFICIENCY ANALYSIS OF THE INDUSTRIAL FIRMS**

**Coordinator: Léopold SIMAR**

## **OBJECTIVES**

Prerequisite: Basics in Mathematics, statistics and microeconomics.

The course concerns the statistical approaches for measuring and inferring about the economic performances of firms. These measures are deduced from the production functions which represent the upper reachable production from a given set of input. In the course we present, in a unified way, the different approaches which have been investigated in the literature: stochastic versus deterministic frontiers, parametric and non-parametric models, etc. Several case studies are dedicated to the analyses of performances in the energy and the car industries.

## **LECTURERS**

<b>Course</b>	<b>Lecturers</b>	<b>Company</b>	<b>Hours</b>	<b>Term</b>
	Léopold SIMAR	Catholic University of Louvain-la-Neuve	18	Spring
Applied Sessions	Frédéric LANTZ	IFP School	6	
Prerequisite (statistics)	Lesya NADZON		6	

**TOTAL HOURS IN CLASS:** 31

- Lectures, 18 h
- Applied sessions, 6 h
- 1 exam, 1 h
- Project, 12 h

**CREDITS US:** 2

**CREDITS ECTS:** 3

## **TRAINING TECHNIQUES**

Lectures and Applied sessions given by Experts

## **TEXTBOOK**

- IFP School Handouts

## **BIBLIOGRAPHY**

- Fried H., Lovell C., Schmidt S. (1993), The measurement of Productive efficiency, Techniques and Applications, Oxford University Press.
- Kumbhakar S., Lovell S., Knox A. (2000), Stochastic Frontier Analysis, Cambridge University Press.

## **GRADING CRITERIA**

- **Written report** on a case study by groups of 2 students (at home) : 50 % of the grade.
- **Oral presentation** with questions : 50 % of the grade.

## **OUTLINE**

1. Introduction : production frontier and economic performances of firms.
2. Deterministic and stochastic parametric models.
3. Efficiency measures : application to energy.
4. Nonparametric models.
5. Sensitivity analysis of economic performances : application to the car industry.
6. Testing productivity changes and tests of return to scale.

## PEM

### Teaching Unit PEM 12

### LINEAR PROGRAMMING

### Pre-requisite Course

Coordinator: Frédéric LANTZ

#### OBJECTIVES

Prerequisite: Basics in Mathematics (Matrix Algebra).

The objectives of this course are to:

- learn the linear programming theory and more precisely the simplex algorithm, a widely used algorithm to solve the linear programming models.
- understand the importance and meaning of marginal costs (dual values).
- be able to build a simplified linear programming model for a standard refinery.
- analyze the results of the optimization of a refining problem given by a typical industrial model.

#### LECTURERS

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	Lecturers	Company	Hours	Term
Lectures	Peter COWLING	University of Bradford	15	Summer

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**TOTAL HOURS IN CLASS:** 17

- Lectures  $5 \times 3 = 15$  h
- 1 Exam, 2 h.

**CREDITS US:** 1

**CREDITS ECTS:** 1,5

#### TRAINING TECHNIQUES

Lectures with Applications and two Projects.

#### TEXTBOOK

- IFP School. Handouts.

## **BIBLIOGRAPHY**

- Dantzig G., Thapa M. (2003), Linear programming, Springer Verlag.
- Sudaram R. (1996), A first course in optimization theory, Cambridge University Press.

## **GRADING CRITERIA**

- 1 Exam : 100% of the grade.

## **OUTLINE**

### **Linear Programming (2.5 days + exam: 0.5 day).**

- Introduction to linear programming; definition of the problem, graphic resolution.
- General formulation of a linear program, basis, canonical form.
- Resolution by the tableau method / by the simplex method.
- Duality, relationship between primal and dual.
- Formulation of a minimization problem, finding an initial basis.
- Economic interpretation of results: marginal costs, marginal rates of substitution, etc.
- Specific cases: degeneracy, equality constraints, bounded variables.
- Resolution algorithms: revised simplex method, interior point methods.

**Teaching Unit PEM 13**  
**ADVANCED ECONOMETRICS**

**Coordinator: Frédéric LANTZ**

**OBJECTIVES**

Prerequisite in Basics Mathematics (Matrix algebra) and Statistics where students will learn how to perform some basic statistical analysis frequently used in both upstream and downstream petroleum industry, marketing, polls, finance, etc. Particular attention will be paid to applications of statistical and probabilistic concepts presented. Computer-based examples and practical applications with Microsoft Excel will be provided throughout the lectures.

At the end of the teaching unit PEM 13, the students will be able to:

- build dynamic econometric models in energy economics and finance
- simulate economic models
- analyze energy and financial markets through econometric tests.

**LECTURER**

	<b>Lecturers</b>	<b>Company</b>	<b>Hours</b>	<b>Term</b>
Course	Chris IOANNIDIS	Brunel University (London)	24	Summer
Prerequisite (statistics)	Lesya NADZON		6	Spring

**TOTAL HOURS IN CLASS:** 6 + 36h = 42 h

- **Prerequisite:** 6 h
- **Lectures** 8 x 3 = 24 h
- **1 Project,** 6 h
- **1 Exam,** 6 h

**CREDITS US:** 2

**CREDITS ECTS:** 3

**TRAINING TECHNIQUES**

Lectures given by Experts.

**TEXTBOOK**

- IFP School Handouts.

**BIBLIOGRAPHY**

- Statistics for business and economics by D. Anderson, D. Sweeney, T. Williams, West Publishing Company, 1997.
- Introduction to econometrics by GS Maddala, MacMillan, 1992.



- Econometrics and Forecasting, by R. Pindyck and D. Rubinfeld, Mc Graw-Hill, 1994.
- Elements of forecasting, by F.X. Diebold, 1998.

**SOFTWARE:** Eviews, Rats

## **GRADING CRITERIA**

- **Project** : 100 % of the grade.

## **OUTLINE**

### **Prerequisite**

#### **1. Univariate, Bivariate Descriptive Statistics & Applications**

- Histograms, pie charts.
- Central tendency characteristics of probability distributions: mean, mode, median.
- Percentiles, box-plot.
- Dispersion characteristics, poverty and inequality measures.
- Cross tabulation: independence or goodness of fit, introduction to Chi-square statistic.

#### **2. Statistical Inference and applications**

- Random variables, expected value and variance.
- Law of Large Numbers and Central Limit Theorem.
- Estimators and estimates, quality criterions.
- Pointwise and confidence interval estimation.

#### **3. Hypotheses testing and applications**

- General principles.
- Parametric Student and Fishers' tests for equality of means or variances.
- Chi-square tests for independence and goodness of fit.

### **Course**

#### **1. Introduction to Econometrics and applications**

- Simple (univariate) linear regression model
- Analytical and geometrical interpretations, R-square goodness of fit criterion
- Tests upon coefficients and residuals.
- Basics of forecasting.

#### **2. Advanced Econometrics**

- Introduction to the dynamic process
- Unit root tests
- Introduction to cointegration tests
- Tests for structural breaks (cusum tests)

#### **3. Cointegration between several variables**

- VAR model (Johansen test)
- Error correction Models
- Impulse function
- Application to oil markets (NYMEX) and financial markets



### **3. LIST OF LECTURERS**

<b>NAME</b>	<b>COMPANY</b>	<b>TITLE</b>	<b>COURSE</b>
ATWAL Glyn	Rennes International School of Business	Professor	Organizational Behavior
Marc BERETTA	INIS ALGA		International Negotiation
BESSION Jacques		Consultant	Production and Reservoir Engineering
BOYER Sylvain	IFP School	Professor	Production and Reservoir Engineering
BOYER Ezekiel	GDF	Commercial Manager	Gas markets
BRET-ROUZAUT Nadine	IFP School	Director of the Center for Economics and Management	Upstream Petroleum Economics Organizational Behavior
CHEHADE Ahmid	Princeps		Downstream Economics Refining
CORNOT Sylvie	ATIC	Consultant	Coal Market
COUTURIER Antoine	IFP School	Professor	Production and Reservoir Engineering
COWLING Peter	University of Bradford	Professor	Industrial Optimization – Linear Programming
DARRICOTE Alan	Rennes International School of Business	Project Manager	Organizational Behavior
DEBERON	IFP Training		Refining
DOAT A.	Total		Production and Reservoir Engineering
DONNEZ Pierre		Consultant	Production and Reservoir Engineering
DUVAL Bernard	IFP School	Former Senior Vice-President of Exploration, Total, Associate Professor	Upstream Petroleum Economics
EGERMANN P.	IFP		Production and Reservoir Engineering
FAVENNEC Jean-Pierre	IFP School	Director Center for Economics and Management	Energy geopolitics Downstream Economics
GORDILLO Victor	PRINCEPS		Refining
HACHE Emmanuel	IFP School	Head of the PEM Program Professor	Commodities markets
HENN Nicolas	GDF		Production and Reservoir Engineering

HUSER-MARTINIE A. C.	TOTAL		Production and Reservoir Engineering
IOANNIDIS Chris	Brunel University (London)	Professor	Advanced Econometrics
KOSKAS Sylvain	BCJK	Certified Public Accountant, Management Consultant, External Auditor	Business Accounting
KRAUSZ Nicole	Paris-Dauphine University	Professor, Consultant LOGICIA	Strategic Management
LANTZ Frédéric	IFP School	Professor	Efficiency Analysis of the Industrial Firms Industrial Optimization Advanced Econometrics
LE GALLO	IFP		Production and Reservoir Engineering
LEGUET Benoit	CDC	Consultant	CO2
LE MIRONNET Carole	IFP School		Refining
LERY Bernard	IFP Training	Director	Refining
LESNE Christian		Consultant	Transport
MABRO Robert		Consultant	Energy Geopolitics
MASSOL Olivier	IFP School	Professor	Industrial Economics
MELARD DE FEUARDENT Anton	ERNST&YOUNG		Fiscalité de l'amont pétrolier
MORIN Emmanuel	Total		Upstream Management
NADZON Lesya			Statistics
PARENT Nicole	Praxeos Management		MBTI
PAUL Daniel	Paris-Dauphine University	Director of the Strategic Management Department	Strategic Management
PRIME Nathalie	ESCP-EAP		International Negotiation / International Marketing
RAUFER Roger	United Nations	Consultant & Professor	Downstream Economics
SITBON Aldo		Consultant	Production and Reservoir Engineering
SIMAR Léopold	Catholic University of Louvain La Neuve	Professor	Efficiency Analysis of the Industrial Firms

SMITH Jamie	Rennes International School of Business	Professor	Marketing
STEVENS Paul	University of Dundee	Professor	Energy Geopolitics
TROTIGNON Marc	EDF	Project Manager	Electricity markets
VIBERT Bruno	Ernst&Young		Fiscalité de l'amont pétrolier
WRIGHT Graham	GWA Associates	Consultant	Oil Crude & Products Trading

## **4. COURSES IN THE PARTNER UNIVERSITIES**

# **AT COLORADO SCHOOL OF MINES**

## **MICROECONOMICS**

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Economic theory applied to decisions of individual producers and consumers. The basic theoretical underpinnings of supply, demand, production, pricing, and costs for energy markets.

## **NATURAL RESOURCE ECONOMICS**

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Introduction to energy and natural resource economics, including topics on markets, cartels, environment, policy and international trade.

## **MACROECONOMICS**

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Development of models to determine income, inflation, interest rates, unemployment, and balance of payments for the whole economy and their effects on the energy sector at the national and international level.

## **PRODUCTION AND OPERATION MANAGEMENT**

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Applications of management science and operations research to operations management, planning functions and managerial decision making in the minerals industry. Geometric programming in engineering design. Introduction to material requirements planning for inventory control; other inventory models. Advanced production scheduling. Integer programming methods for distribution planning and capital budgeting.

## **ENERGY ECONOMICS AND REGULATION**

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Modeling of all major energy markets including the topics of supply and demand, market structure, energy transportation, game theory, futures and options markets, policy, regulations, and conservation.

## **CORPORATE FINANCE**

---

Introduction to the fundamentals of corporate finance as they pertain to the valuation of investments, firms, and the securities they issue. Included are the relevant theories associated with capital budgeting, financing decisions, investment decisions and working capital management.

## **ADVANCED MINERAL ASSET VALUATION**

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The use of stochastic and option pricing techniques in mineral asset valuation. The Hotelling Valuation Principle. The impact of diversification on mineral firm value. The effects of taxes and environmental permitting on project value. A lot of interesting readings and case-studies.

## **INVESTMENTS AND PORTFOLIO MANAGEMENT**

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The environment and process of investment in theory and practice, providing a comprehensive understanding of the dynamics of securities markets, valuation techniques and trading strategies for stocks, bonds, and derivative securities.

## **LINEAR PROGRAMMING**

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Many applications with the software Ampl.



# **AT GUBKIN UNIVERSITY**

( more than 50 % in Russian )

## **FUNDAMENTALS OF ECONOMICS**

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Macroeconomics

Microeconomics

## **TECHNICAL ASPECTS OF OIL AND GAS INDUSTRY**

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Exploration and Drilling

Production

## **FUNDAMENTALS OF MATHEMATICS**

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Statistics and theory of probabilities

Linear Programming

Non-linear Programming

## **PETROLEUM AND ENERGY ECONOMICS**

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Petroleum Economics (with a project)

Oil markets

Gas marketing

Management of oil and gas companies

Decision making

# AT OKLAHOMA UNIVERSITY

## CORE COURSES( 22 hours : one course from each area )

	COURSE	TITLE
CORE AREA # 1 <b>MANAGEMENT</b>  (3 Credits)	MGT 5373	International Management
	BAD 5313	Strategic Management
	MIS 5003	Introduction to Management Information Systems
	MIS 5323	Project Management
	MIS 5463	Technology and Innovation Management
CORE AREA # 2 <b>ENERGY</b>  (3 Credits)	ECON 4753	Analysis of Contemporary Economic Issues
	GEOL 4970	Seminar: The Energy Outlook: How does it affect Business & Economics I
CORE AREA # 3 <b>ECONOMICS</b>  (3 Credits)	ECON 5373	Advanced Regulation of Public Utilities
	ECON 5363	Market Process Economics
	ECON 4353	Public Finance
	ECON 5613	International Economics, Trade
	ECON 5033	Managerial Economics I
	ECON 5853	World Economic Development
CORE AREA # 4 <b>STATISTICS</b>  (3 Credits)	ECON 5023	Statistics for Decision Making
	ECON 5243	Econometrics II
	PSY 5003	Statistics I
	BAD 6243	Applied Univariate Statistics
	ECON 5213	Econometrics I
	ECON 4223	Econometric Analysis
CORE AREA # 5 <b>GEOSCIENCE</b>  (3 Credits)	GEOL 4133	Petroleum Geology for Geoscientists
	GEOL 5134 (4 hrs)	Applied Reservoir Characterization
	GEOL 6970	Intro. to Reservoir Characterization
	GEOL 4970	Unconventional Hydrocarbons
	PE 4113	Oil Field Development
	PE 5603	Intro. to Natural Gas Engineering & Management
CORE AREA # 6 <b>FINANCE</b>  (3 Credits)	FIN 5990	Directed Readings
	FIN 5103	Investments / Portfolio
	FIN 5043	Financial Administration of the Firm
	FIN 5113	Derivative Securities and Markets
	FIN 5413	Financial Engineering

<b>ENERGY RELATED RESEARCH PAPER (4 Credits)</b>	BAD 5490	Readings in Business Communications and Business Administration (Energy Management)
	ECON 5960	Readings in Economics
	GEOL 5990	Special Studies in Petroleum Geology and Geophysics
	METR 5990	Independent Study
	PE 5990	Special Studies in Petroleum
	MGT 6960	Readings in Management

**ELECTIVES at OU**

(10 - 12 hours from the following list of courses)

<b>1</b>	LAW 6550	Oil and Gas Contracts (2 credits)
<b>2</b>	LAW 6100	International Petroleum Transactions (2 credits)
<b>3</b>	LAW 6540	Oil and Gas Law (3 credits)
<b>4</b>	LAW 6100	Energy Law (2 credits)
<b>5</b>	LAW 6040	International Business Transactions (3 credits)
<b>6</b>	LAW 6060	Public International Law (3 credits)
<b>7</b>	MGT/SCM 5053	Productions / Operations Management
<b>8</b>	MGT 5373	Seminar in International Business
<b>9</b>	BAD 5023	Management Science
<b>10</b>	ECON 5353	Public Finance II
<b>11</b>	ECON 5613	International Trade
<b>12</b>	ECON 6123	Planning and Policy Analysis
<b>13</b>	ECON 5153	Mathematical Economics I
<b>14</b>	FIN 4513	Financial and Energy Risk Management
<b>15</b>	ACCT 5013	Quantitative Financial Controls
<b>16</b>	ECE 5163	Generations Resource Scheduling and Portfolio Optimization
<b>17</b>	EMGT 4800 /PE 5990	Current Issues in Energy Management
<b>18</b>	PE 5613	Natural Gas Engineering
<b>19</b>	PE 5623	Natural Gas Process
<b>20</b>	B AD 5262	Production/Operations Management
<b>21</b>	B AD 5273	Marketing Management
<b>22</b>	IE 5743	Management Engineering Function

## **AT TEXAS A&M**

### **WATERFLOODING**

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Design, surveillance and project management of waterfloods in reservoirs.

### **PETROLEUM DEVELOPMENT STRATEGY**

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Applications of variables, models, and decision criteria used in modern petroleum development. The case approach will be used to study major projects such as offshore development and assisted recovery. Both commercial and student-prepared computer software are used during lab sessions to practice methods.

### **PETROLEUM RESERVOIR DESCRIPTION ( Technical requirement)**

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Engineering and geological evaluation techniques to define the extent and internal character of a petroleum reservoir; estimate depositional environments during the formation of the sedimentary section and resulting effects on reservoir character.

### **FLUID FLOW IN PETROLEUM RESERVOIRS (Technical requirement)**

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Analysis of fluid flow in bounded and unbounded reservoirs, wellbore storage, phase redistribution, finite and infinite conductivity fractures; dual-porosity systems, gas wells.

### **ADVANCED RESERVOIR ENGINEERING**

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Petroleum reservoir simulation basics including solution techniques for explicit problems.  
Group Project : Translation of a simulation software in Visual Basic.

### **ENHANCED OIL RECOVERY METHODS ( Thermal)**

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Fundamentals of enhanced oil recovery methods and applications of thermal recovery methods.

### **EXPLORATION AND PRODUCTION EVALUATION**

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Selected topics in oil industry economic evaluation including offshore bidding, project ranking and selection, capital budgeting, long-term oil and gas field development projects and incremental analysis for assisted recovery and acceleration.

### **STATISTICAL ANALYSIS**

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Introduction to probability, probability distributions, and statistical inference; hypotheses testing using t and F test; introduction to methods of analysis such as tests of independence, simple regression, analysis of variance with some consideration of planned experimentation..

### **SURVEY OF MANAGEMENT**

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The course provides an understanding of how a corporate strategy is implemented and how different areas, such as research, production, financing, marketing, etc., are involved.

Management concepts and applications important to managers in all types and sizes of organization; includes: strategic planning, goal setting, control, and managerial ethics; decision making, organizing, human resource management, including staffing, performance appraisal, and compensation; leadership, motivation, communication and group processes; achieving organizational quality and managing in a global environment.

Research Paper: Women in Management (example).

## **SURVEY OF MARKETING**

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The course provides an introduction to different aspects of markets and marketing methods. The material focuses on the main concepts involved in a firm's commercial activity and includes market analysis and sales strategy.

## **REGIONAL INTEGRATION IN THE AMERICAS**

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Examination of theory and application of regional economic, political and social integration, North American integration from the perspective of NAFTA members; role of multinational enterprises; topics pertaining to the negotiation, impact and extension of NAFTA.

## **INTERNATIONAL MANAGEMENT**

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Survey of the issues, problems, challenges, and opportunities facing organizations competing in a global economy; includes : the environment of international management, international strategies, forms of organization design used by multinational firms, managing human resources in an international context, and cultural and control issues facing the international manager.

## **SENIOR PROJECT**

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1<sup>st</sup> semester: Design of the ring thruster, an innovative propeller with no central shaft created by Harbor Branch Oceanographic Inc. The objective is to design a propeller, which can be easily modified to test different settings, within technical and budget restrictions.

2<sup>nd</sup> semester: Realization of the project.

## **MARINE FIELD PROJECT**

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One week on board the "Delphinus" in Marathon, Fl. Objective: collect oceanographic data (biological, chemical, physical, and geological) as a part of a government project to map the channel off Marathon Island. Operating major oceanographic devices including rigging underwater. Writing a report including all data collected as a group project.