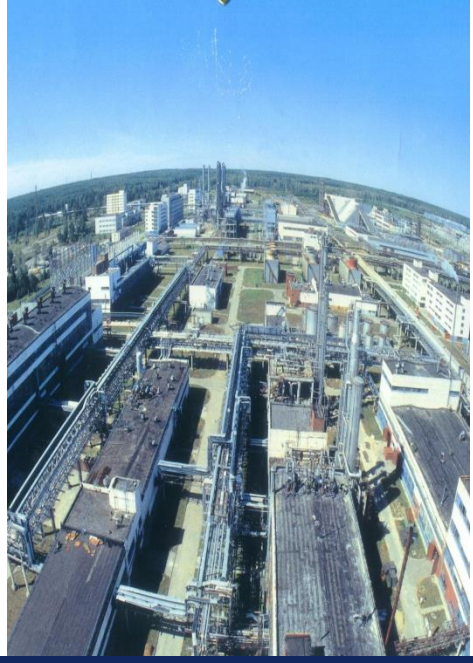

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Delivering the Module "Natural Resources for Chemical Industry" through the Medium of English

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Outline

1. Module Profile
2. Outcomes
3. Syllabus Overview
4. Assessment Tools


Professional Training in Chemical Technology in English

Field of the primary curriculum	Chemical Technology
Training programs	Chemical Technology of Organic Substances Technology and Processing of Polymers
Degree	Bachelor
Year	3 (5/6 semesters)
5 semester	Introduction to Chemical Engineering
6 semester	Natural Resources for Chemical Industry
Types of academic activities:	
Seminars, hours	32/32
Self-guided work, hours	32/32
Type of interim attestation	Test


Cross-discipline interaction

Prerequisites	English Ecology Organic Chemistry
Corequisites	Technology of Raw Hydrocarbons Processing Chemical Engineering Industrial Chemistry


Module mastering goals

- forming the professionally oriented English communicative skills, to integrate into the international environment and use the language as a tool of business, professional and intercultural communication

- developing an understanding of how raw hydrocarbons may be treated and used for chemical industry for all types of natural hydrocarbon resources


Outcomes

	Knowledge	Skills	Experience
Content	To **categorize** the main **raw hydrocarbons** and compare various processing routes	To **evaluate** the process **parameters** and **refine methods** for raw materials treatment	To **implement** maths for evaluating process parameters and designing chemical equipment
English	To know **the peculiarities** of international **technical** and **scientific papers**, **engineering documentation** structure	To **demonstrate socializing skills** in international medium, to translate and represent reports orally and in writing	To **apply collaborative approaches** in research, developing and designing activities


Content of English module

№	Sections	Types of academic activity:			
		Reading	Writing	Listening*	Speaking
1	Energy Sources (renewable and non-renewable) (4 hours)	[1]			
2	Lignocellulose-Based Chemical Products (2 hours)	[2]			
3	Starch Applications (4 hours)	[3]			
4	Coal and Peat (4 hours)	[4]			Describing schemes
	Conference week	Essay: “Perspectives of non-conventional fuel sources”			
5	Natural Gas Processing (4 hours)	[5]			
6	Oil-Refining (6 hours)	[6]			Debates “The oil origin theory”
7	Water Systems in Industrial Plants (4 hours)	[7]			
	Test Oral presentation of the project	Project work “Manufacture of the xylenes (or another chemical)”			

*https://www.coursera.org
*https://www.edx.org


Resources for reading

[1] F. Orecchini, V. Naso / Energy Systems in the Era of Energy Vectors, Green Energy and Technology // Chapter 2. Energy Resources. – Springer-Verlag London Limited 2012.– 72 p.

[2] Ed de Jong, Richard J.A. Gosselink / Bioenergy Research: Advances and Applications // Chapter 17. Lignocellulose-Based Chemical Products. – 37 p.

[3] Bronwyn G. Laycock, Peter J. Halley / Starch Polymers // Chapter 14. Starch Applications: State of Market and New Trends. – Elsevier.– 2014. – 39 p.

[4] M. Hook / Encyclopedia of Sustainability Science and Technology edited by Robert A. Meyers. // Chapter 9. Coal and Peat: Global Resources and Future Supply.– Springer Science+Business Media New York. – 2013.– 31 p.

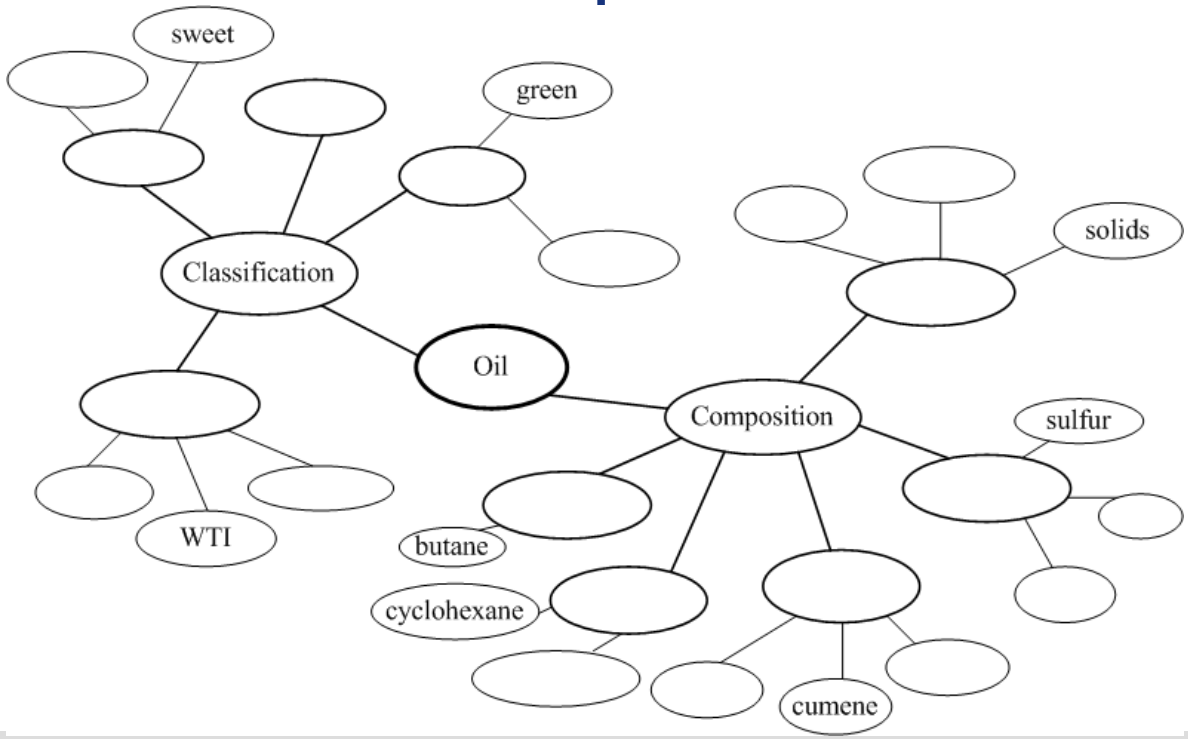
[5] T.K. Ghosh, M.A. Prelas / Energy Resources and Systems: Volume 1: Fundamentals and Non-Renewable Resources // Chapter 7. Natural gas. – Springer Science + Business Media B.V. 2009. – 101 p.

[6] Kukurina O.S., Rozanova Ya.V. English for Specific Purposes. Oil-Refining. – Tomsk: TPU Publishing House, 2013. – 101 p.

[7] Jijnasa Panigrahi, Sharad C. Sharma / Industrial Wastewater Treatment, Recycling, and Reuse. – Elsevier Ltd. 2014. – 25 p.

Reading Tasks

- Filling gaps
- Mind mapping
- Answering questions techniques




Speaking

- Monologues (various processes, equipment and schemes descriptions)
- Dialogues (collaborative tasks, discussions)
- Group interaction (debates)

Speaking

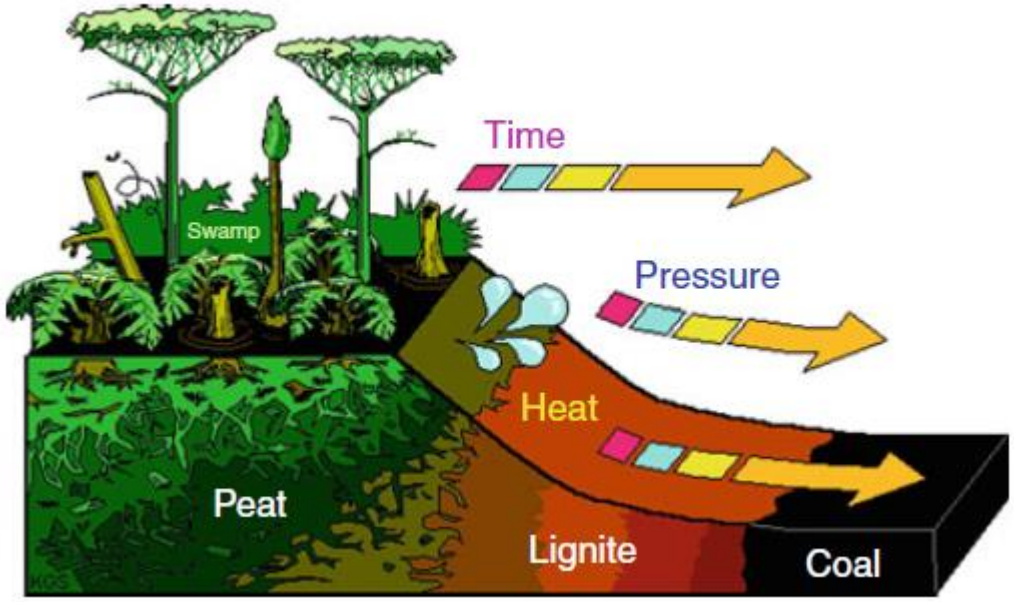
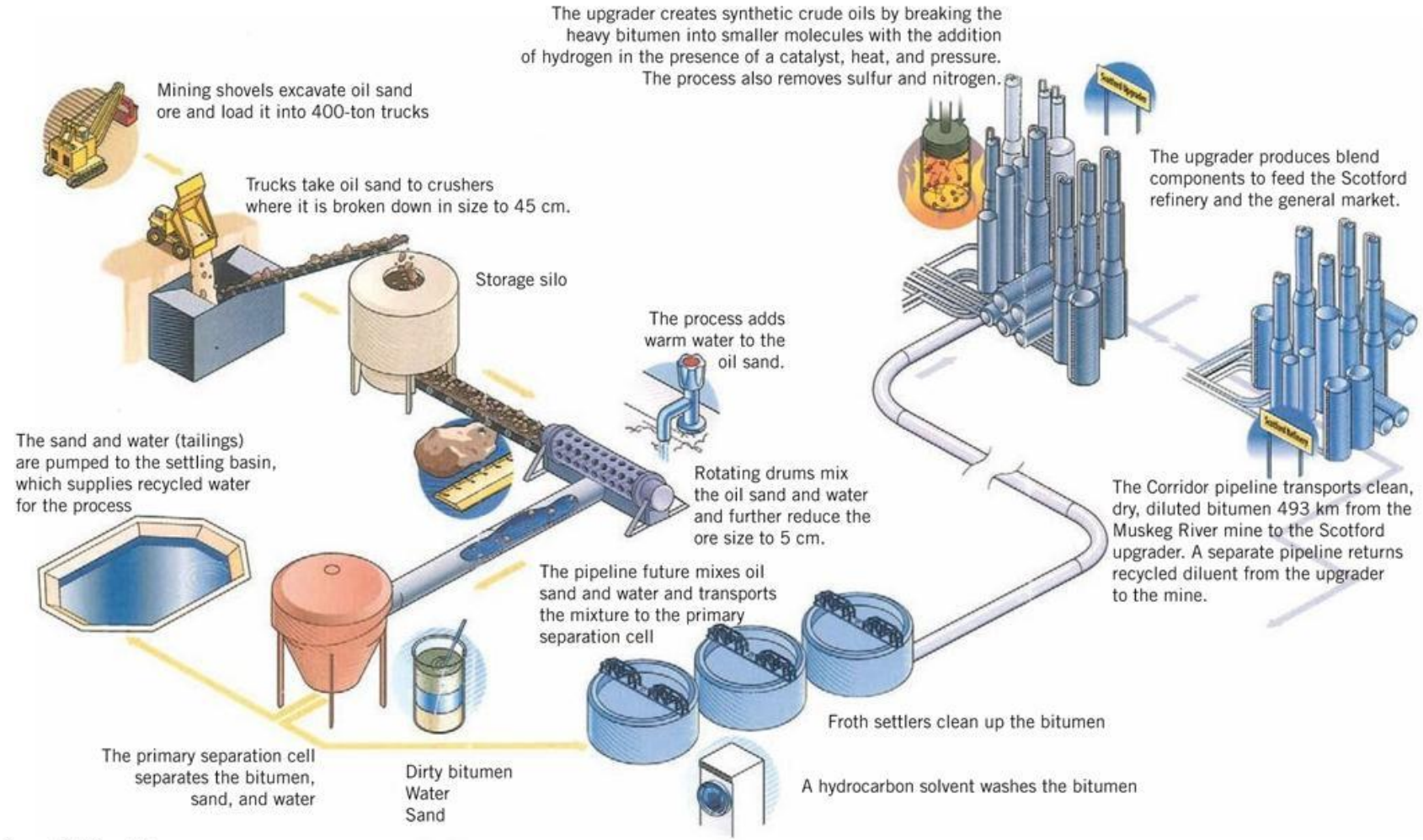


Figure 1. Principle mechanism of the formation of coal and peat [4]

ATHABASCA OIL SANDS PROJECT

FIG. 3



Source: Shell Canada Energy

[http://leadenergy.org/wp-content/uploads/2011/02/Athabasca-Diagram2.jpg]

Speaking

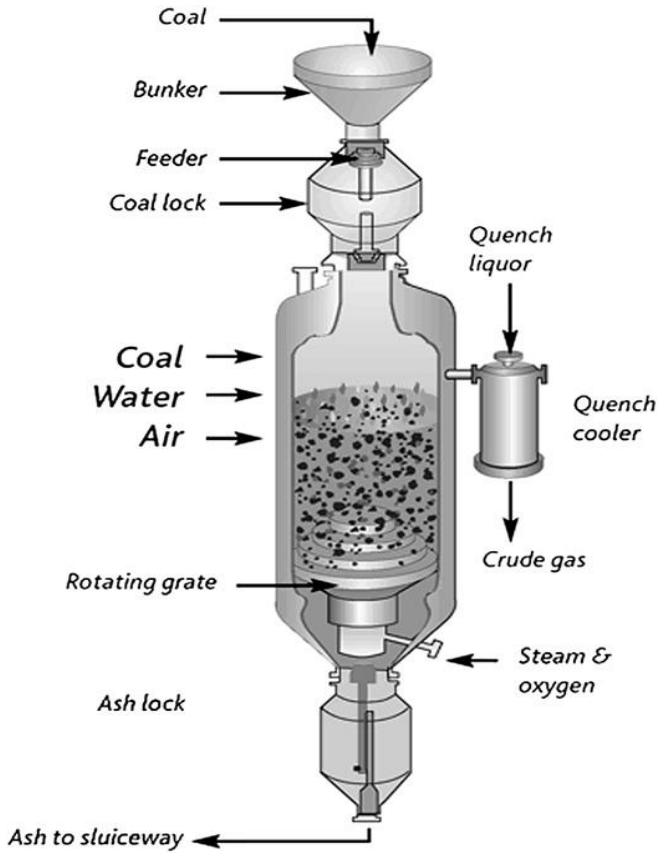


Figure 2. The Sasol-Lurgi gasifier.

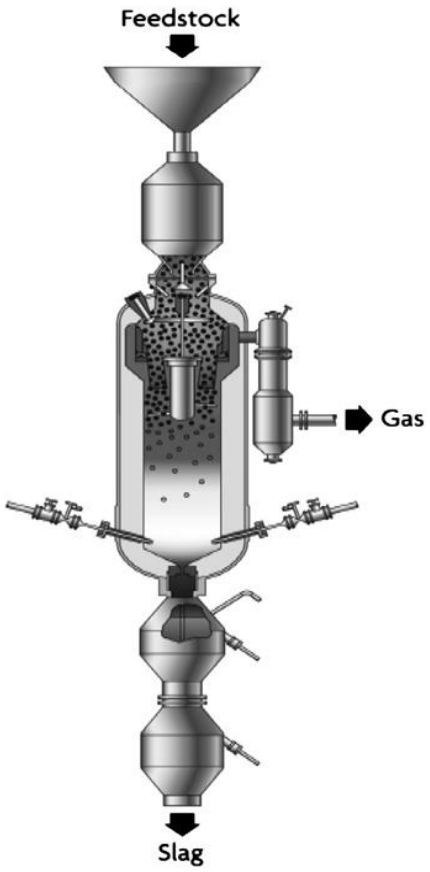


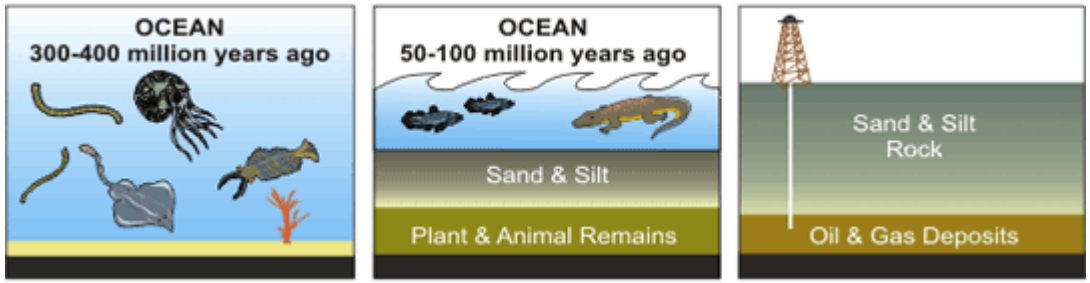
Figure 3. The BGL gasifier.

[David A. Bell, Brain F. Towler, Maohong Fan. Coal Gasification and Its Application // Elsevier, 2011]

Speaking

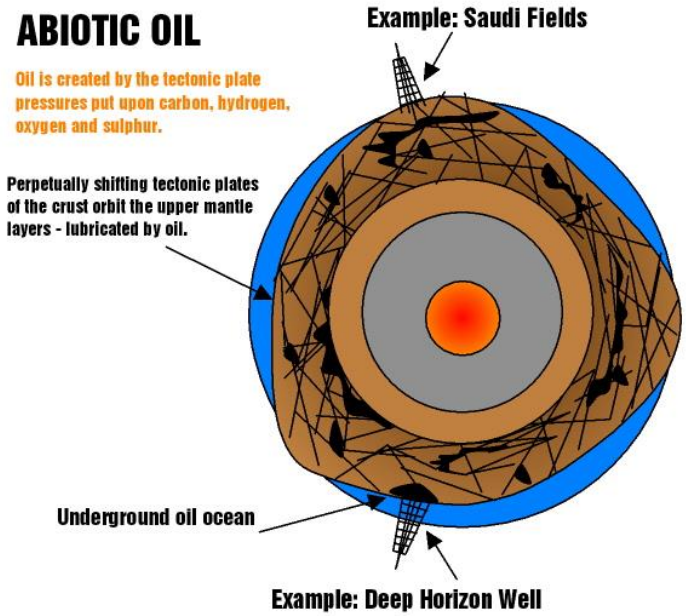
Debates “THE OIL ORIGIN THEORY”

Biogenic theory



[http://motorcitytimes.com/mct/wp-content/uploads/2010/05/OIL-and-GAS-FORMATION.gif]

Abiogenic theory



[http://rachels-carson-of-today.blogspot.ru/2012/09/the-abiotic-origin-of-petroleum-fueling.html]

Answer the question: “What kind of theory has the right to exist?”

Writing

- Two major written assignments:
  - Essay, Summary, Review
  - Project work (chemicals production design)

Glossary / Technical Terminology

"Skeleton" of bachelor academic activity

Game Tasks

Assessment Tools

Assessment

Guideline, be valid and reliable, transparent and efficient

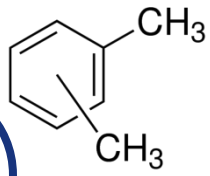
Formative

Reading questions
Evaluation of each seminar work
Writing a mid-term essay

60 credits

Summative

Case study:
Manufacture of Xylenes



Assignment

1. Draw a PFD
2. Perform material balances
3. Perform energy balances
4. Design the reactor
5. Determine the ROI

for this project

40 credits

PFD – process flow diagram
ROI – return on investment


Conclusion

- Practically, students achieve the assigned outcomes, in common, they are able to represent their activity results, to analyze various chemical techniques, but find writing challenging.
- It is necessary to design assessment tools and set of criteria to evaluate students' performance and their personal achievements during the semester.

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Thank You !

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