



Studiegids MSc. PGsE, 2026-2029, Cohort-07

Petroleum Geoscience and Engineering

- The science concerned with finding oil and gas resources and exploiting them in an environmentally and economically sound manner.
- The program combines mathematics, geology, engineering and applied earth sciences to study the developments within the petroleum industry.
- Students master a combination of geosciences and engineering for the specific needs of petroleum exploration and production
- Three specialization tracks:
 - Petroleum Geology
 - Petroleum Engineering
 - Offshore Engineering

Program Objectives

- Offering an interdisciplinary Master's degree in which petroleum geology and engineering are central, with a choice of one of the specializations: Petroleum Geology, Petroleum Engineering or Offshore Engineering.
- Educating to professionals who can function at an academic level of work and thinking, whereby a solid foundation has been laid for employment as a starting geoscientist or engineer, mainly in the professional field onshore and offshore Suriname and the Caribbean.
- Educating to professionals who have knowledge of current developments within the field of petroleum exploration and exploitation, both onshore and offshore, with a focus on Suriname and the Caribbean.
- Teaching lifelong learning skills that enable the graduate to continue his/her education in scientific research or to further professionalize within the field.

Program Outline

- **DURATION:** 3 YEARS (120 ECTS)
- **NUMBER OF STUDENTS:** 14
- **START:** Jan 2026
- **DEGREE:** Master of Science
- **EDUCATIONAL SYSTEM:** MODULAR (COURSE START TO FINISH, INCL. EXAMINATION)
- **CREDIT POINTS DISTRIBUTION:** 40 WEEKS & CREDIT POINTS/ YEAR (~1 POINT/WEEK~28 HRS/WEEK)
- **DAYS/ TIME (LECTURE):** MON- FRI (17-21u), SAT. (09-13u); TYPICALLY, TWO WEEKS OF LECTURE PER COURSE
- **FEES:** USD 2000, - college fee & *SRD 4250, - registration fee ANNUALLY *(registration fee subject to change depending on MINOWC)
- **VENUE:** Onsite/ Online/ Hybrid (Covid Depending; Laptop/ Internet required)

Admission to MSc Program

BSc Degree in Mechanical Engineering or Geoscience

PLUS

Deficiency Courses (Pre-Master)

Physical Geology

Sedimentology

Structural

Geology

Geology of the Guiana

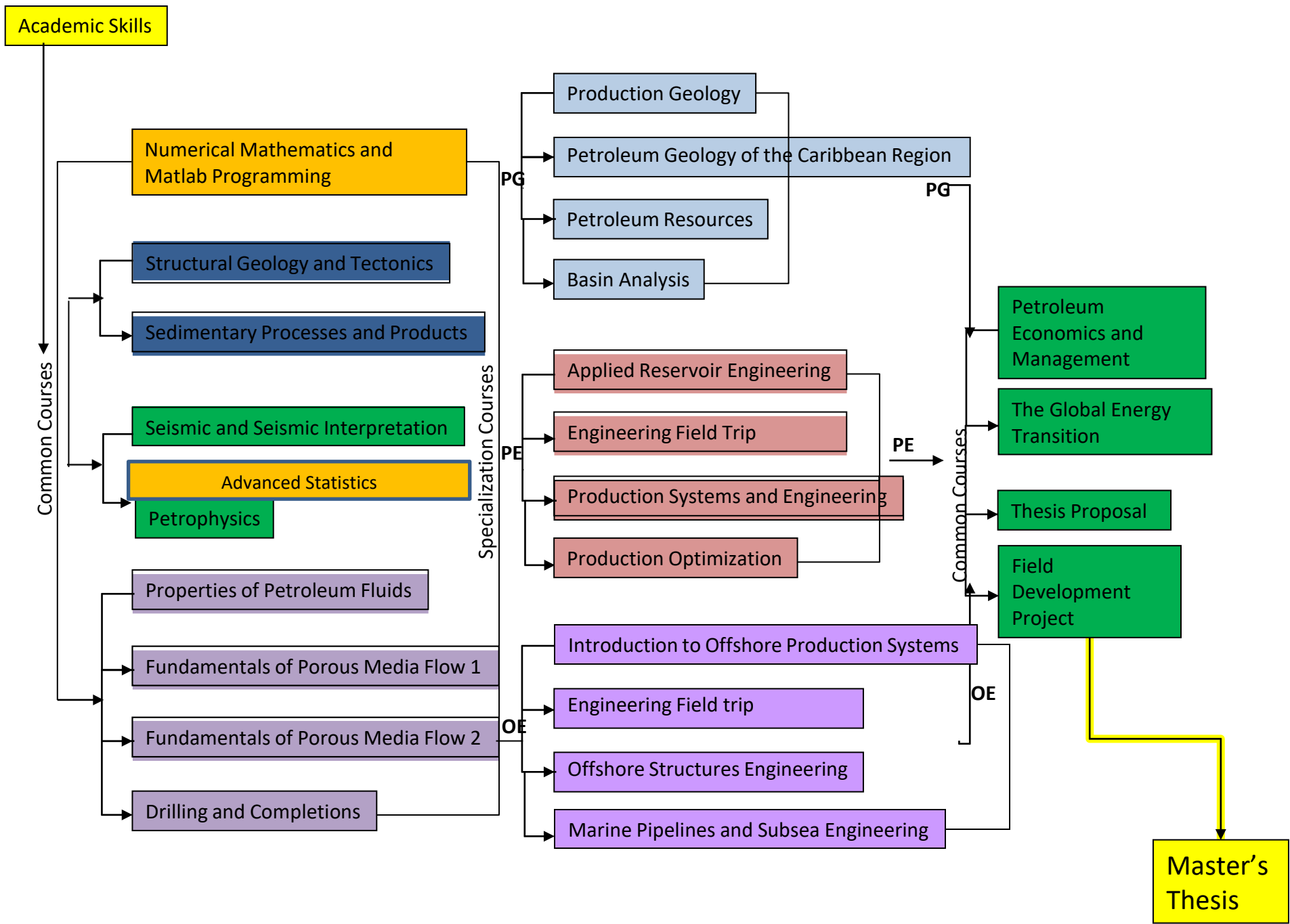
Basin Petroleum Geology

Historical Geology

Petroleum Winning

Numerical Analysis & Technical Calculus (Mechanical Engineering Course)

Differential Equations (Mechanical Engineering Course)



Course Overview Year-01 MSc.PGsE

YEAR:	COURSE CATEGORY:	#:	COURSE CODE:	COURSE NAME:	# OF ECTS:	# OF WEEKS:
01	COMMON COURSES	01	GW700	ACADEMIC SKILLS	3	3
		02	GW701	NUMERICAL MATHEMATICS AND MATLAB PROGRAMMING	5	5
		03	GW702	STRUCTURAL GEOLOGY AND TECTONICS	7	7
		04	GW703	SEDIMENTARY PROCESSES AND PRODUCTS	7	7
		05	GW800	SEISMIC AND SEISMIC INTERPRETATION	5	5
		06	GW801	ADVANCED STATISTICS	3	3
		07	GW802	PETROPHYSICS	4	4
		08	GW803	PROPERTIES OF PETROLEUM FLUIDS	4	4

Course Overview Year-01 MSc.PGsE

		08	GW803	FUNDAMENTALS OF POROUS MEDIA FLOW: SINGLE PHASE FLOW	5	5
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Course Overview Year-02 MSc.PGsE

YEAR:	COURSE CATEGORY:	#:	COURSE CODE:	COURSE NAME:	# OF ECTS:	# OF WEEKS:
02	COMMON COURSES	01	GW900	FUNDAMENTALS OF POROUS MEDIA FLOW: MULTI PHASE FLOW	5	5
		02	GW901	DRILLING AND COMPLETIONS ENGINEERING	5	5
	SPECIALISATION COURSES PG	03	GW902	PRODUCTION GEOLOGY	4.5	4.5-5
		04	GW905	PETROLEUM GEOLOGY OF THE CARIBBEAN REGION	7.5	7.5-8
		05	GW907	PETROLEUM RESOURCES	4.5	4.5-5
		06	GW1000	BASIN ANALYSIS	3.5	3.5-4
	SPECIALISATION COURSES PE	07	GW903	APPLIED RESERVOIR ENGINEERING	5.5	5.5-6
		08	GW906	ENGINEERING FIELD TRIP	3.5	3.5-4
		09	GW908	PRODUCTION SYSTEMS AND ENGINEERING	5.5	5.5-6
		10	GW1001	PRODUCTION OPTIMIZATION	5.5	5.5-6
	SPECIALISATION COURSES OE	11	GW904	INTRODUCTION TO OFFSHORE PRODUCTION SYSTEMS	4	4
		12	GW906	ENGINEERING FIELD TRIP	3.5	3.5
		13	GW909	OFFSHORE STRUCTURES ENGINEERING	6.5	6.5-7
		14	GW1002	MARINE PIPELINES AND SUBSEA ENGINEERING	6	6
	COMMON COURSES	15	GW1003	PETROLEUM ECONOMICS AND MANAGEMENT	5	5
		16	GW1004	THE GLOBAL ENERGY TRANSITION	4	4

29/03/2025

Course Overview Year-03 MSc PGsE

YEAR:	COURSE CATEGORY:	#:	COURSE CODE:	COURSE NAME:	# OF ECTS:	# OF WEEKS:
03	COMMON COURSES	01	GW1100	THESIS PROPOSAL	4	4
		02	GW1101	FIELD DEVELOPMENT PROJECT	7	7
		03	GW1102	THESIS	30	30-38

Overview Lecturers

	Naam	m/v	Education	Institute	Year of degree	Courses in PGSE
1	Dr.Gerda Visser	f	Educational Sciences	University of Leiden	2009	Academic Skills
2	Ir. S.R.Kisoensingh	m	Petroleum Engineering	TU Delft, The Netherlands	2014	Numerical Mathematics and Matlab Programming Fundamentals of Porous Media Flow: Single Phase Flow
3	Douglas Paton PhD	m	Geology	University of Edinburg	2002	Structural Geology and Tectonics Petroleum Resources
4	S. Kalapnat-Kisoensingh, MSc.	v	Sedimentology	Utrecht University, Netherlands	2009	Sedimentary Products and Processes
5	Dr. J. Ten Veen	m	Geology/Earth Science	Vrije Universiteit Amsterdam	1991	Seismic and Seismic Interpretation
6	G. Ooft PhD	m	Applied Economics	John Hopkins University-England	2015	Advanced Statistics
6	Drs. J. Lutgert	m	Sedimentology	Utrecht University, Netherlands	1986	Petrophysics
7	T. Ravestein, MSc	m	Applied Earth Sciences	TU Delft, The Netherlands	2014	Fundamentals of Porous Media Flow: Multi Phase Flow
8	Kheireddine Redouane PhD	m	Reservoir Engineering	University of Boumerdes, Algeria	2023	Properties of Petroleum Fluids

Overview Lecturers continued

9	Prof. Schulte Ph.D.	m	High Energy Particle Accelerators	Eindhoven University of Technology, The Netherlands	1978	Applied Reservoir Engineering
10	Ir. S. Leijnse	m	Petroleum Engineering	TU Delft, The Netherlands	2010	Drilling and Completions Engineering
11	Drs. C. Geel	m	Sedimentology	Utrecht University, Netherlands	1985	Production Geology
12	Ariana Osman PhD	f	Geoscience	The University of the West Indies - St. Augustine, Trinidad	2024	Petroleum Geology of the Caribbean Region
13	K. Reuber, PhD	m	Earth Science	University of Houston, USA	2017	Basin Analysis
14	A. Mohan, MSc.	m	Petroleum Engineering	Heriot-Watt University Schotland	2015	Production Systems and Engineering
15	Ir. V. Sewbaran	m	Offshore and Dredging Engineering	TU Delft, The Netherlands	2018	Introduction to Offshore Production Systems Offshore Structures Engineering
16	Ir. W. Botermans	m	Petroleum Engineering	TU Delft The Netherlands	1996	Production Optimization
17	Ir. V. Krolis	m	Offshore Engineering	TU Delft, The Netherlands	2008	Marine Pipelines and Subsea Engineering
18	Drs. Lucia Van Geuns	m	Earth Sciences	University of Leiden, The Netherlands	1980	Petroleum Economics and Management The Global Energy Transition

Overview Counterpart Lecturers

	Naam	m/v	Opleiding	Instituut	Vakken
1	M.Wolff, MSc	f	Petroleum Geology	ADEKUS, Suriname	Structural Geology and Tectonics
2	E. Acosta	m	Petroleum Engineering	La Universidad del Zulia	Petrophysics
3	W. Ramdhiansingh MSc.	f	Petroleum Geology	ADEKUS, Suriname	Seismic and Seismic Interpretation
4	D. Bihari, MSc	m	Petroleum Geology	ADEKUS, Suriname	Petroleum Geology of the Caribbean Region
5	Shaiza Simons	f	Petroleum Geology	ADEKUS, Suriname	Properties of Petroleum Fluids
6	V. Gopal, MSc	f	Petroleum Engineering	ADEKUS, Suriname	Fundamentals of Porous Media Flow: Multi Phase Flow Applied Reservoir Engineering
7	K. Tjadikrama, MSc	f	Petroleum Engineering	ADEKUS, Suriname	Applied Reservoir Engineering
8	R. Bhajan, MSc.	m	Petroleum Engineering	ADEKUS, Suriname	Drilling and Completions Engineering Offshore Structures Engineering
9	R. Ramdajal, MSc.	m	Petroleum Geology	ADEKUS, Suriname	Production Geology

Overview Counterpart Lecturers continued

10	I. Goelaman, MSc.	v	Petroleum Geology	ADEKUS, Suriname	Petroleum Resources Basin Analysis
11	R. Mangnoesing, MSc, MBA	m	Mineral Resource Economics	Bedrijfskunde Erasmus Universiteit	The Global Energy Transition Petroleum Economics and Management
12	S. Raghoe, MSc	v	Petroleum Geology	ADEKUS, Suriname	Introduction to Offshore Production Systems
13	R.Dubois MSc	m	Petroleum Geology	ADEKUS, Suriname	Marine Pipelines and Subsea Engineering

Integrated Overview Lecturers/Counterparts

Y01 Jan-Dec2026	Academic Skills	Gerda Visser PHd	Gerda.Visser-Wijnveen@uvs.edu	Ginny Bijnaar MSc.
	Numerical Mathematics and Matlab Programming	Ir. Shailesh.Kisoensingh	shaileshkisoensingh@hotmail.com	None
	Structural Geology and Tectonics	Douglas Patton PHd	douglas@tectonknow.com	Meredith Wolf MSc.
	Sedimentary Products and Processes	Sharista Kalapnat-Kisoensingh MSc.	sharistakisoensingh@gmail.com	None
	Seismic and Seismic Interpretation	Dr. Johan. Ten Veen	johan.tenveen@tno.nl	Winita Ramdhiansingh MSc.
	Petrophysics	Drs. Jan Lutgert	jan.lutgert@ziggo.nl	Elias Acosta, MSc.
	Properties of Petroleum Fluids	Kheiderinne Redouane PHd	kheireddine.redouane@ntnu.no	Shaiza Simons MSc.
	Fundamentals of Porous Media Flow: Single Advanced Statistics	Ir. Shailesh.Kisoensingh Gavin Ooft PHd	shaileshkisoensingh@hotmail.com ooftgavin@gmail.com	None None
Y02 Jan -Dec 2027	Fundamentals of Porous Media Flow: Multi Phase Flow	Ir. Thomas Ravestein	sjur@sjur.nl	Vedika Gopal MSc.
	Drilling and Completions Engineering	Ir. Steven Leijnse	steven.leijnse@ziggo.nl	Rayan Bhajan, MSc.
	Production Geology	Drs. Cees Geel	cr_geel@ziggo.nl	Rakesh Ramdajal, MSc.
	Petroleum Geology of the Caribbean Region	Ariana Osman PHd		Dheeraj Biharie MSc.
	Petroleum Resources			Ilaisha Goelaman, MSc.
	Basin Analysis	Kyle Reuber, Phd	reuberk@gmail.com	Ilaisha Goelaman, MSc.
	Applied Reservoir Engineering	Willem Schulte PHd	willem.schulte@sogic.nl	Kimberly Tjadikrama MSc.
	Field Trip- Engineering as part of lecture Petroleum Geol of Car Region	refer to lecturer Petroleum Geology of the Caribbean Region	ariana.osman@gmail.com	refer to field trip coordinator
	Production Systems and Engineering	Amresh Mohan, MSc.	amreshmohan@staatsolie.com	None
	Production Optimization	Ir. Wouter Botermans	wouter.botermans@b-pes.nl	Xandria Sewberath Misser, MSc.
	Introduction to Offshore Production Systems	Ir. Vinay Sewbaran	vinaysewbaran@outlook.com	Sheryl Raghoe, MSc.
	Offshore Structures Engineering	Ir. Vinay Sewbaran	vinaysewbaran@outlook.com	Rayan Bhajan, MSc.
	Marine Pipelines and Subsea Engineering	Ir. Victor Krolis	vkrolis@gmail.com	Roshan Dubois, MSc.
	Petroleum Economics and Management The Global Energy Transition	Drs. Lucia Van Geuns Drs. Lucia Van Geuns	luciavangeuns@hcss.nl luciavangeuns@hcss.nl	Robbin Magnoesing MBA Robbin Magnoesing MBA
Y03 Jan-Dec 2028	Thesis Proposal	Various Lecturers and counterparts		
	Field Development Project			
	Thesis			

GW700 ACADEMIC SKILLS

General Course Information

GENERAL		
Name of the Study Program:	<input type="checkbox"/> BSc. Geowetenschappen (BSc. Gw) <input checked="" type="checkbox"/> MSc. Petroleum Geoscience & Engineering (MSc. PGsE) <input type="checkbox"/> MSc. Mineral Geosciences (MSc. MGs)	
Course Code:	GW700	
Course Name:	ACADEMIC SKILLS	
Study Load [ECTS]:	3	
Assumed Knowledge, Prerequisites or Co-requisites:	No pre-requisites	
Relationship to other courses within the program:	This course assists the student in maximizing his/her study success. The student is prepared to become a successful learner. In this regard emphasis is placed on critical thinking, reading, writing and listening skills and other skills which aid in academic development and learning.	
STAFF		
Lecturer:	Contact details:	
Counterpart Lecturer:	Contact details	
ESTIMATED STUDY LOAD		
¹ Lecture & Classroom Practical [hrs]:	20	NOTES: <ul style="list-style-type: none"> • N/A if not applicable to the course • Totals should match ECTS load equivalent • Practical includes contact hours and hours required by student to solve practical. • 1: Contact Hours • 2: Self Study Hours
² Literature Study-01 [hrs]:	24	
² Take Home Practical- Hand In Exercises/ Paper/ Presentation [hrs]:	32	
¹ Practical- Presentation/ Feedback [hrs]:	8	
² Examination- Preparation/ Literature Study-02 [hrs]:	0	
¹ Examination- Oral [hrs]:	0	
¹ Examination- Written [hrs]:	0	
Total Hours (ECTS x 28hrs):	84	

*For more information on study load calculation please refer to <https://msingermany.co.in/european-credit-system-ects/>

Course Description:

This course prepares the student for scholarly work necessary during the Master's program. It also introduces the student to academic writing and thinking that enables the student to become reflective and a critical thinker. The course emphasizes the importance of developing academic skills early on and teaches the student to design graduate level research proposals and final thesis.

- Searching for, critically evaluating and interpreting, studying and reproducing scientific information,
- Performing a literature search and literature review successfully and ways to properly reference information and avoid plagiarism,
- Use of ICT tools,
- The importance of proper research (and experiment) design,
- Testing for feasibility and relevance of the object under scrutiny,
- Formulating the research problem and hypothesis
- Testing the hypothesis
- Designing the materials and methods chapter
- Data generation, importance of statistical analysis, interpretation and presentation
- The importance of drawing the correct conclusions and making recommendations for follow-up research

Learning Outcomes:

- Search for relevant scientific sources using specific search engines and compile a short list of literature from a long list.
- Formulate a problem statement.
- Identify the preconditions for the critical application of knowledge.
- Determine own study style.
- Consult relevant sources for active learning, reading and listening.
- Is able to use specific internet sources (information and documentation systems) to search for scientific literature, and to evaluate scientific sources under supervision on the basis of value;
- Can read scientific texts and professional literature and interpret the data in it with guidance;
- Has developed the vocabulary relevant to the field;
- Can give an overview of the tool-building domain and thus make a more specific choice of the subject when graduating.
- Can give a short presentation/ summary of 10 minutes on the content of two scientific texts and/ or professional literature within the geosciences domain.

Teaching Method:

Skills will be developed and tested through academic assignments consisting of one or more of the following formats: homework, class room assignments, critical interpretation of scientific publications, discussion sessions, individual and/or group written and verbal presentations; all contributing factors to help shape the academic skills of the participants.

Course Contents:

- a. Lecture Content:
 - i) Study/ Academic skills
 - ii) Research methodology

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- iii) Scientific publications
- iv) Academic reading
- v) Academic writing
- vi) Literature review
- vii) Problem Definition
- viii) Critical thinking

b. Practical:

- ix) take-home
- x) 'in-class' exercises

Conditions for Examination:

Course Evaluation:

Course Necessities:

No specific necessities.

Textbooks and/or Reference Books:

- Gaast van der, K., Koenders, L, Post, G. (2015). Academische vaardigheden voor interdisciplinaire studies. Amsterdam, Nederland: Amsterdam University Press
- Van Cleemput, O. and Saso, L. (2017). Manual on Scientific Communication for Postgraduate Students and Young Researchers in Technical, Natural and Life Sciences. DOI 10.5772/intechopen.69870. ISBN: 978-953-51-3442-8 (download as pdf)

General Course Information

GENERAL		
Name of the Study Program:	<input type="checkbox"/> BSc. Geowetenschappen (BSc. Gw) <input checked="" type="checkbox"/> MSc. Petroleum Geoscience & Engineering (MSc. PGsE) <input type="checkbox"/> MSc. Mineral Geosciences (MSc. MGs)	
Course Code:	GW701	
Course Name:	NUMERICAL MATHEMATICS AND MATLAB PROGRAMMING	
Study Load [ECTS]:	5	
Assumed Knowledge, Prerequisites or Co-requisites:	<ul style="list-style-type: none"> Basic knowledge of mathematics (analytical integration, derivation, linear algebra) and informatics or relevant computer science course. Applied skills in the use of MS Office Modules. 	
Relationship to other courses within the program:	This course is required for: - GW801 Petrophysics - GW802 Properties of Petroleum Fluids - GW803 Fundamentals of Porous Media Flow: Single Phase Flow - GW900 Fundamentals of Porous Media Flow: Multi-phase Flow - GW1101 Field Development Project	
STAFF		
Lecturer:	Contact details:	
Counterpart Lecturer:	Contact details	
ESTIMATED STUDY LOAD		
¹ Lecture & Classroom Practical [hrs]:	44	NOTES: <ul style="list-style-type: none"> N/A if not applicable to the course Totals should match ECTS load equivalent Practical includes contact hours and hours required by student to solve practical. 1: Contact Hours 2: Self Study Hours
² Literature Study-01 [hrs]:	43	
² Take Home Practical- Hand In Exercises/ Paper [hrs]:	52	
¹ Practical- Presentation/ Oral Examination [hrs]:	1	
² Examination- Preparation/ Literature Study-02 [hrs]:	0	
¹ Examination- Oral [hrs]:	0	
¹ Examination- Written [hrs]:	0	
Total Hours (ECTS x 28hrs):	140	

*For more information on study load calculation please refer to <https://msingermany.co.in/european-credit-system-ects/>

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Course Description:

The Numerical Mathematics and Matlab Programming course allows students to become familiar with non-analytical mathematical subjects such as numerical errors, Taylor series and its application in Euler's method, finite method calculations and how numerical solutions can be programmed with a tool such as Matlab.

Learning Outcomes:

Students will generally be able to:

- Describe the various numerical methods to solve 1st order differential equations (e.g. Euler's Method)
- Describe the various numerical methods to solve 2nd or higher order differential equations (e.g. Finite Volume/ Difference Method)
- Determine the order of magnitude of the error adhering to different numerical methods and describe its significance
- Develop Matlab-scripts for various numerical methods to have a computer perform multiple iterations
- Describe the developed Matlab-scripts
- Use of software packages (incl. computer graphics output etc)
- Application of academic skills (technical writing & presentation skills)
- Teamwork
- Ability to answer questions/ substantiate/ improvise
- Theory, application and analysis of various numerical methods as well as the magnitude of the error associated

Teaching Method:

The teaching method for this course implies lecture presentations, classroom exercises, take home exercises per group, where the exercises should be handed in by writing a short technical paper where the problem, assumptions, method for solution and solution is described, followed by a presentation and Q&A as a formal oral examination.

Course Contents:

c. Lecture Content

- i. Basic Matlab introduction
- ii. Derivatives and integration
- iii. Euler's method for solving differential equations
- iv. Newton-Raphson method
- v. Taylor series
- vi. Error calculations
- vii. Runge-Kutta method
- viii. Matrix factorization
- ix. Finite Difference Method (incl. Richardson's error estimation)
- x. Finite Volume Method

d. Practical

The practical aspect of this course implies exercises which need to be solved, where the solution is documented by writing a short technical paper per exercise subject, followed by a presentation & oral exam.

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Conditions for Examination:

The examination of this course implies handing in a technical paper per target date, followed by a presentation and oral examination per planning. The oral examination will cover Q&A from the presentation as well theoretical questions regarding the lecture content.

Course Evaluation:

*For all subtasks, a minimum grade of 5.0 (no round-off) is required, however the final course grade should be at least 5.5 (after round-off)

Course Necessities:

- MS Words/ Excel/ PowerPoint
- Matlab (Laptop)

Textbooks and/or Reference Books:

- Numerieke Methoden voor Differentiaalvergelijkingen, C. Vuik, P. van Beek, F. Vermolen, J. van Kan, 2004, Delft University of Technology, Faculty Elektrotechniek, Wiskunde en Informatica Delft Institute of Applied Mathematics.
- Introduction to MATLAB (syllabus), E. Pekalska, 2001-2005, Delft University of Technology.
- FVM, Long Chen Literature
- Anziam J 54 (CTAC2012), FVM & FDM Literature
- Applied Numerical Methods with MATLAB for Engineers and Scientists by Steven C. Chapra Dr. (z-lib.org)

GW702 STRUCTURAL GEOLOGY AND TECTONICS

General Course Information

GENERAL		
Course Code:	GW702	
Course Name:	STRUCTURAL GEOLOGY AND TECTONICS	
Study Load [ECTS]:	7	
Assumed Knowledge, Prerequisites or Co-requisites:	Familiarity with basic Structural Geology, in particular the description and standard terminology of structures, map reading and understanding of basic processes.	
Relationship to other courses within the program:	This course is part of the Geology common courses of the MSc degree program Petroleum Geoscience and Engineering. The topics of this course are applicable for courses such as Seismic and Seismic Interpretation, and for all specialization tracks, especially courses such as Basin analysis, Petroleum Geology of the Caribbean Region and the Field trip.	
STAFF		
Lecturer:	Contact details:	
Counterpart Lecturer:	Contact details	
ESTIMATED STUDY LOAD		
¹ Lecture & Classroom Practical [hrs]:	48	NOTES: <ul style="list-style-type: none"> • N/A if not applicable to the course • Totals should match ECTS load equivalent • Practical includes contact hours and hours required by student to solve practical. • 1: Contact Hours • 2: Self Study Hours
² Literature Study-01 [hrs]:	40	
² Take Home Practical- Hand In Exercises/ [hrs]:	48	
¹ Practical- Feedback [hrs]:	9	
² Examination- Preparation/ Literature Study-02 [hrs]:	48	
¹ Examination- Oral [hrs]:	N/A	
¹ Examination- Written [hrs]:	3	
Total Hours (ECTS x 28hrs):	7*28=196	

*For more information on study load calculation please refer to <https://msingermany.co.in/european-credit-system-ects/>

Course Description:

This course focuses on the nature, origin and interpretation of deformation structures preserved in the Earth's crust, on scales ranging from that of basins and orogens, to those of folds, fault zones and microfabrics. Aspects covered include structural geometry and kinematics, rock deformation mechanisms,

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES - FTeW

Learning Outcomes:

At the end of the course, the student:

- Knows and understands the processes involved in the development of crustal deformation structures, at the macro-, meso- and microscales;
- Can recognise “structural styles” (associations of structures characteristic of specific tectonic settings), based on observations, and understands their development;
- Has insight in features and processes that are important in analyzing deformed terrains and in constructing tectonic models.

In terms of key skills, the student has learned to:

- Analyze, structure and synthesize information;
- Apply various methods and techniques of structural analysis;
- Efficiently write short reports and make poster presentations.
-

Teaching Method:

The course will consist of lectures alternating with exercises and each student will have to prepare a written report on a relevant topic.

- Lecture presentations using PowerPoint for illustrations;
- In class questions and quizzes;
- In class exercises to engage students during lectures;
- Practical assignments, reporting via (email) posters or reports.

Course Contents:

e. Contents:

- i. Geometry of structures
 - Fault properties,
 - Fault patterns, kinematics
- ii. Kinematics: “Structural styles”
 - Salt, rift, delta tectonics
 - Inversion, thrust, strike slip tectonics
- iii. Dynamics: rock Mechanics
 - Fracturing
 - Flow

f. Assignments:

Home Assignments:

1. Fault correlation and depth contour map
2. Fault and salt tectonics
3. Structural styles
4. The use of brittle-ductile models in understanding structure development
5. Experiments with sandstones
6. Flow law for rock salt

Practical Assignments:

- (1) Fault associations and tectonic regimes: Rottumeroog – Groningen

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

- (2) Structural styles of Salt tectonics
- (3) Structural style of Delta tectonics
- (4) Designing a scale model for the Eastern Alps
- (5) On fractures, failure and healing: Explaining low production rates from a producing oil reservoir
- (6) The rocksalt paradox: deformation behavior and microstructure of salt in nature and experiment

Conditions for Examination:

All practical assignments should be delivered before the final exam unless otherwise stated.

Course Evaluation:

*For all subtasks, a minimum grade of 5.0 (no round-off) is required, however the final course grade should be at least 5.5 (after round-off)

Course Necessities:

- Basic Microsoft Office
- MS Teams
- Laptop
- Degree triangle (gradendriehoek)

Textbooks and/or Reference Books:

Fossen, H. (2016). Structural Geology 2nd edition. Cambridge: Cambridge University Press
Selected papers from the geological literature

**COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -
GW703 SEDIMENTARY PROCESSES AND PRODUCTS**

General Course Information

GENERAL		
Name of the Study Program:	<input type="checkbox"/> BSc. Geowetenschappen (BSc. Gw) <input checked="" type="checkbox"/> MSc. Petroleum Geoscience & Engineering (MSc. PGsE) <input type="checkbox"/> MSc. Mineral Geosciences (MSc. MGs)	
Course Code:	GW703	
Course Name:	SEDIMENTARY PROCESSES AND PRODUCTS	
Study Load [ECTS]:	7	
Assumed Knowledge, Prerequisites or Co-requisites:	<ul style="list-style-type: none"> • Sedimentology (BSc. Course); see textbooks below • BSc Sedimentary Systems, textbook G. Nicholson - Sedimentology and Stratigraphy, second (2009) or later edition. 	
Relationship to other courses within the program:	<ul style="list-style-type: none"> • Elementary knowledge for Petroleum Geosciences and Applied Petroleum Technology. • Complementary courses: Structural geology and tectonics; Seismic and seismic interpretation. • The course complements future courses on Properties of Petroleum Fluids, Petroleum economics and management, petroleum geology and resources, porous media, reservoir engineering. 	
STAFF		
Lecturer:	Contact details:	
Counterpart Lecturer:	Contact details:	
Name: N/A	N/A	
ESTIMATED STUDY LOAD		
¹ Lecture & Classroom Practical [hrs]:	28	NOTES: <ul style="list-style-type: none"> • N/A if not applicable to the course • Totals should match ECTS load equivalent • Practical includes contact hours and hours required by student to solve practical. • 1: Contact Hours • 2: Self Study Hours
² Literature Study-01 [hrs]:	12	
² Take Home Practical-Essay [hrs]:	76	
¹ Practical- Presentation/ Feedback [hrs]:	12	
² Examination- Preparation/ Literature Study-02 [hrs]:	65	
¹ Examination- Oral [hrs]:	0	
¹ Examination- Written [hrs]:	3	
Total Hours (ECTS x 28hrs):	196	

*For more information on study load calculation please refer to <https://msingermany.co.in/european-credit-system-ects/>

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

Course Description:

The course shows how observations of the rock record lead to questions about causes and effects in the genesis of (3D) sedimentary successions. Focus is on river-delta-shelf-open marine/oceanic systems (from source to sink), and on the relevant physical, chemical and biological processes and other controls.

- Quantification of sediment flux and landscape evolution in association with tectonics and climate;
- Features of river - delta – shelf – deep marine stratigraphy that can be used to reconstruct past climate and sea-level change;
- Using knowledge about past climates, sea-level (change) and tectonics to predict the character of sedimentary successions away from points of control;

Learning Outcomes:

After successful completion of the course students will be able to interpret the physical, chemical and biological processes and other controls that led to the formation of 3D sedimentary successions.

Teaching Method:

The lectures demonstrate the important issues and questions with regards to the analysis and interpretation of 3D sedimentary successions. During the practical hours, generally directly after or in between the lectures, student presentations, short assignments, further guidance on the course content and assistance in essay writing will be given. The latter also through e-mail/Moodle.

Course Contents:

g. Lecture Content

- i. Discussion of sedimentary systems and processes that have been active, with emphasis on the Suriname region since the Palaeozoic;
- ii. Subaerial sedimentary systems: origin and character of sediments; transport by water and wind; hydrodynamics; alluvial (and aeolian) systems;
- iii. Sedimentation in deltas, clastic coastlines and shallow seas; similarities and differences with carbonate systems; effects of sea-level changes; sequence stratigraphy;
- iv. Evolution of basin dynamics (tectonics, paleoclimate, palaeoceanography, palaeogeography, vegetation) in northern S. America during the Phanerozoic;
- v. Sedimentation along continental margins and in the pelagic realm; formation of source and reservoir rocks

h. Practical

- i. Oral presentations
- ii. Essay writing

Conditions for Examination:

Course Evaluation:

*For all subtasks, a minimum grade of 5.0 (no round-off) is required, however the final course grade should be at least 5.5 (after round-off)

Course Necessities:

- MS Teams
- MS Words/ PowerPoint

Textbooks and/or Reference Books:

- Einsele, G. (2000), Sedimentary Basins: evolution, facies and sediment budget, second edition, Springer.
- G. Nicholson -Sedimentology and Stratigraphy, Wiley-Blackwell; second (2009) or later edition.

N.B.: For those who participated in the Bachelor course on sedimentology by Sharista Kalapnat-Kisoensingh, MSc., the content of the book of Nicholson is expected to be common knowledge. Other students are requested to familiarize themselves with the content of this book.

- Reprints of scientific papers related to the course content handed out during the lectures.

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -
GW800 SEISMIC AND SEISMIC INTERPRETATION

General Course Information

GENERAL		
Name of the Study Program:	<input type="checkbox"/> BSc. Geowetenschappen (BSc. Gw) <input checked="" type="checkbox"/> MSc. Petroleum Geoscience & Engineering (MSc. PGsE) <input type="checkbox"/> MSc. Mineral Geosciences (MSc. MGs)	
Course Code:	GW800	
Course Name:	SEISMIC AND SEISMIC INTERPRETATION	
Study Load [ECTS]:	5	
Assumed Knowledge, Prerequisites or Co-requisites:	The student is expected to have good knowledge in: <ul style="list-style-type: none"> • Structural geology • Petroleum geology • A basic (geo)physical understanding • Applied skills in the use of MS Office Modules 	
Relationship to other courses within the program:	This course is compulsory for students pursuing the MSc Programme in Petroleum Geosciences and Engineering. The course is complementary to the following courses: <ul style="list-style-type: none"> • Structural Geology and tectonics (GW702) • Sedimentary processes and products (GW703) This course complements all future courses of the specialization Petroleum Geosciences and some of the specialization Petroleum & Offshore Engineering.	
STAFF		
Lecturer:	Contact details:	
Counterpart Lecturer:	Contact details	
ESTIMATED STUDY LOAD		
¹ Lecture & Classroom Practical [hrs]:	40	NOTES: <ul style="list-style-type: none"> • N/A if not applicable to the course • Totals should match ECTS load equivalent • Practical includes contact hours and hours required by student to solve practical. • 1: Contact Hours • 2: Self Study Hours
² Literature Study-01 [hrs]:	20	
² Take Home Practical- Hand In Exercises/ Paper/ Essay/Report/ Field Excursion [hrs]:	36	
¹ Practical- Presentation/ Feedback [hrs]:	9	
² Examination- Preparation/ Literature Study-02 [hrs]:	32	
¹ Examination- Oral [hrs]:	0	

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

¹ Examination- Written [hrs]:	3	
Total Hours (ECTS x 28hrs):	140	

*For more information on study load calculation please refer to <https://msingermany.co.in/european-credit-system-ects/>

Course Description:

The course covers the theory of the seismic methods (reflection seismics), including acquisition and (basic) processing of seismic data. This theory will be used to perform seismic interpretation exercises and assignments. The course will be completed with a written, closed book exam.

Learning Outcomes:

After completion of the course the student will be able to:

- Understand the principles and pitfalls of the seismic method.
- Perform a basic and sensible seismic interpretation that shows the ability to apply general geological background knowledge.
- Understand its value as a subsurface exploration and production tool to find hydrocarbons (or to characterize the subsurface in general).
- Give an overview of workflows in subsurface modelling and highlight dependencies between seismic interpretation (and its uncertainties) and further E&P activities.
- Communicate the performed work (exercises) and motivate solutions

Teaching Method:

- Lectures on specific topics (see course description)
- Students will perform practical assignments on paper and in Petrel both in class and at home
- Solutions will be discussed by performing demonstrations of seismic interpretation with PC-based software (Petrel®) where possible

Course Contents:

a. Contents

- Introduction: seismic interpretation as a step in subsurface modelling for exploration and production of hydrocarbons / Fundamentals of the seismic method / Storage and display of seismic data / Seismic resolution. Short Introduction to Seismic Interpretation software (Petrel) / Demonstration of simple horizon interpretation
- Volume attributes as aid in structural and stratigraphic interpretation / Structural styles / Interpretation of fault planes in 3D / Links to Framework Modelling / 3D visualization techniques
- Time-depth conversion methods and their input data and tying seismic to well data
- 3D seismics/Auto-tracking techniques for interpretation of continuous reflections / Jump correlation across faults / Enhancement techniques for improving interpretability
- Large-scale depositional geometries and controlling processes / Interpretation techniques for unconformities and lap surfaces / Direct Hydrocarbon Indicators (DHI)/ Spectral decomposition for stratigraphic visualization and DHI
- Seismic attributes/imaging/ volume visualisation for prediction of reservoir quality, fluid fill and as indicator for morphological feature

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

- Introduction to Seismic Inversion Methods and AVO as aid in determining physical structure and properties of the subsurface
 - Overview of current state-of-the-art and upcoming technologies
 - Unscheduled (i.e., will be used throughout): Seismic Artefacts, Pitfalls, Case Examples
- b. The lectures are supplemented by practical exercises to be made by the students during practical class hours (in the week the teacher will be present at AdeKUS) and to finalize at home. The solutions will be discussed in class. Solutions of all the exercises need to be documented by writing one (1) individual short technical report (preferably in WORD or Powerpoint (saved as pdf) and following the requirements listed in the exercise manual). This document should also cover the final practical exercise. The results of the final practical exercise latter should be also documented in Powerpoint presentation that forms the basis for a subsequent presentation and Q&A.

Conditions for Examination:

Course Evaluation:

*For all subtasks, a minimum grade of 5.0 (no round-off) is required, however the final course grade should be at least 5.5 (after round-off)

Prerequisite Necessities:

- MS Teams
- MS Office (Word, Powerpoint, Excel)
- Petrel software (provided by AdeKUS and Petrel project with exercises (provided by lecturer) to be used for exercises

Textbooks and/or Reference Books:

Bond, C.E., Lunn, R.J., Shipton, Z.K.2 and Lunn, A.D., 2012. What makes an expert effective at interpreting seismic images? *Geology*, 40-1, p. 75–78; doi:10.1130/G32375.1

Brown, A.R., 2005. Pitfalls in 3-D Seismic Interpretation, *Search and Discovery Article #40145* (2005), Posted March 12, 2005.

Brown, A.R., *Interpretation of Three-Dimensional Seismic Data*, AAPG Memoir 42, 7th Edition/SEG Investigation in Geophysics, No. 9 – Chapter 1

Brown, A.R., *Interpretation of Three-Dimensional Seismic Data*, AAPG Memoir 42, 7th Edition/SEG Investigation in Geophysics, No. 9 – Chapter 5



General Course Information

GENERAL		
Name of the Study Program:	<input type="checkbox"/> BSc. Geowetenschappen (BSc. Gw) <input checked="" type="checkbox"/> MSc. Petroleum Geoscience & Engineering (MSc. PGsE) <input type="checkbox"/> MSc. Mineral Geosciences (MSc. MGs)	
Course Code:	TBA	
Course Name:	Crash Course Advanced Statistics	
Study Load [ECTS]:	TBA	
Assumed Knowledge, Prerequisites or Co-requisites:	Statistics on a bachelor's level (basic descriptive statistics, simple linear regression)	
Relationship to other courses within the program:	This course provides a foundation for MSc research projects. It builds upon BSc-level statistics and supports thesis work by introducing methods for hypothesis testing, model validation, and regression analysis.	
STAFF		
Lecturer:	Contact details:	
Name: Dr. Gavin Ooft		
Counterpart Lecturer:	Contact details	
N/A	N/A	
ESTIMATED STUDY LOAD		
¹ Lecture & Classroom Practical [hrs]:	21 hours	NOTES: <ul style="list-style-type: none"> • N/A if not applicable to the course • Totals should match ECTS load equivalent • Practical includes contact hours and hours required by student to solve practical. • 1: Contact Hours • 2: Self Study Hours
² Literature Study-01 [hrs]:	7 hours	
² Take Home Practical- Hand In Exercises/ Paper/ Essay/Report/ Field Excursion [hrs]:	NA	
¹ Practical- Presentation/ Feedback [hrs]:	3.5 hours	
² Examination- Preparation/ Literature Study-02 [hrs]:	NA	
¹ Examination- Oral [hrs]:	NA	
¹ Examination- Written [hrs]:	NA	
Total Hours (ECTS x 28hrs):	NA	

*For more information on study load calculation please refer to <https://msingermany.co.in/european-credit-system-ects/>

Course Description:

This crash course equips MSc students with statistical skills for geoscience and engineering applications. Moving

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

beyond descriptive statistics, students learn to assess reliability, test hypotheses, design representative sampling schemes, validate models, and interpret correlations and regression models. Emphasis is also placed on data visualization as a tool for exploration, validation, and communication of results. Students will apply statistical methods to datasets, preparing them to analyze and present their thesis results.

Learning Outcomes:

After successfully completing the course, students will be able to:

1. Refresh and apply descriptive statistics to geoscience and engineering datasets.
2. Construct and interpret confidence intervals and perform power analysis.
3. Formulate and test hypotheses using appropriate methods.
4. Design and critique sampling strategies.
5. Validate statistical models and identify overfitting/underfitting.
6. Critically assess correlation versus causation.
7. Apply simple and multiple regression responsibly.

Teaching Method:

- Lecture presentations (theory, worked examples).
- Classroom practicals with Excel.
- Literature study (pre-class preparation and assigned reading).
- Student presentations results with feedback.

Course Contents:

a. Lecture Content

- Day 1: Refresher – descriptive statistics, distributions, correlation basics, introduction to visualization.
- Day 2: Statistical reliability & power analysis, visualizing confidence intervals.
- Day 3: Hypothesis testing & significance, visualizing group comparisons.
- Day 4: Sampling design, visualizing sampling distributions and bias.
- Day 5: Model validation & overfitting, residual plots and cross-validation graphs.
- Day 6: Correlation vs. causation, scatterplots and spurious correlation visuals.
- Day 7: Regression analysis (simple & multiple), regression lines, confidence bands, prediction intervals.

b. Practical

- Literature study on visualization pitfalls in geoscience.
- Exercises:
 - Creating histograms, scatterplots, and residual plots in Excel.
 - Visualizing overfitting with training vs. test data.
 - Presenting a case study with graphs that distinguish correlation from causation.
- Student presentations with findings.

Conditions for Examination:

Course Evaluation:

*For all subtasks, a minimum grade of 5.0 (no round-off) is required, however the final course grade should be at least 5.5 (after round-off)

Course Necessities:

- Laptop
- Microsoft Excel or equivalent.

Textbooks and/or Reference Books:

- Pedersen, B. (2000). Basic Statistics and Principal Component Analysis Applied to Log Analysis.
- Davis, J.C. (2002). Statistics and Data Analysis in Geology.



GW802 PETROPHYSICS

General Course Information

GENERAL		
Course Code:	GW802	
Course Name:	PETROPHYSICS	
Study Load [ECTS]:	4	
Assumed Knowledge, Prerequisites or Co-requisites:	<ul style="list-style-type: none"> • Sedimentology • Stratigraphy and stratigraphic correlation • Structural geology (basins, faults and fractures). • Basics of Petroleum Geology 	
Relationship to other courses within the program:	<p>This course is compulsory for students pursuing specialization in petroleum engineering or offshore engineering.</p> <p>The course is complementary to the following courses:</p> <ul style="list-style-type: none"> • Applied Reservoir Engineering • Petroleum Economics and Management • Field Development Project 	
STAFF		
Lecturer:	Contact details:	
Counterpart Lecturer:	Contact details	
ESTIMATED STUDY LOAD		
¹ Lecture & Classroom Practical [hrs]:	32	NOTES: <ul style="list-style-type: none"> • N/A if not applicable to the course • Totals should match ECTS load equivalent • Practical includes contact hours and hours required by student to solve practical. • 1: Contact Hours • 2: Self Study Hours
² Literature Study-01 [hrs]:	10	
² Take Home Practical- Hand In Exercises [hrs]:	32	
¹ Practical- Presentation/ Feedback [hrs]:	0	
² Examination- Preparation/ Literature Study-02 [hrs]:	35	
¹ Examination- Oral [hrs]:	0	
¹ Examination- Written [hrs]:	3	
Total Hours (ECTS x 28hrs):	112	

*For more information on study load calculation please refer to <https://msingermany.co.in/european-credit-system-ects/>

Course Description:

During the course it will be explained how subsurface properties can be derived and quantified from well logging measurements. The techniques discussed include openhole wireline interpretations, logging while drilling and measurement while drilling methods and coring techniques. The importance of interaction with other geoscience disciplines will be highlighted. Special attention will be given to subjects where petrophysics interacts with:

- Reservoir geology, i.e. interpolation and extrapolation of reservoir properties
- Reservoir engineering, i.e. upscaling of reservoir properties
- Volumetrics and economics, i.e. through uncertainty quantification of reservoir properties.

Learning Outcomes:

After successful completion of the course the student will be able to:

- Conduct an independent petrophysical evaluation of a well (including properties as clay content, porosity and saturation)
- Critically review existing petrophysical evaluations.
- Understand the importance of uncertainties and sensitivity analyses, especially for volumetric evaluations.

Teaching Method:

The working of petrophysical tools and interpretation techniques will be explained using PowerPoint presentations, videos and spreadsheets/ matlab. After the introduction of each new tool type or interpretation technique the theory is put into practice by performing a series of spreadsheet/ matlab calculations. Also, during lectures students are actively queried on their understanding of the subjects explained. The availability of a laptop with excel & matlab is a prerequisite to performing the exercises.

Course Contents:

During the course the following topics will be discussed:

- A thorough description of physical principles and responses of all the commonly used open hole logging devices such as: Spontaneous Potential, Gamma Ray, Acoustic, Neutron, Density and resistivity devices.
- Introduction level presentations of the use of LWD techniques, image logs, Nuclear Magnetic Resonance logging, coring techniques and cased hole logging tools.
- Several interpretation techniques will be explained to derive:
 - Volumetric estimates of reservoir components including shale volume, porosity, permeability and hydrocarbon content. Interpretation techniques will include Clean Sand Evaluation (Archie), Shaly Sand Evaluation (Simandoux, Indonesia)
 - Capillary Pressure
 - Application of core measurements for reservoir evaluation and calibration
 - Cross plot interpretation for lithology, porosity and hydrocarbon effects
 - Comparison of shale volume, porosity, saturation and permeability methods
 - How to derive cut-off criteria for net reservoir and net pay

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

At the end of the course, a petrophysical evaluation of typical sandstone reservoirs has been performed using spreadsheet/ matlab calculations. The spreadsheet/ matlab script can be used by the students as a template to evaluate other wells.

Conditions for Examination:

Course Evaluation:

*For all subtasks, a minimum grade of 5.0 (no round-off) is required, however the final course grade should be at least 5.5 (after round-off)

Course Necessities:

- MS Teams
- MS Office
- Matlab

Textbooks and/or Reference Books:

Malcolm H. Ryder (2002), The Geological Interpretation of Well Logs, 2nd ed.

**COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -
GW803 PROPERTIES OF PETROLEUM FLUIDS**

General Course Information

GENERAL		
Name of the Study Program:	<input type="checkbox"/> BSc. Geowetenschappen (BSc. Gw) <input checked="" type="checkbox"/> MSc. Petroleum Geoscience & Engineering (MSc. PGsE) <input type="checkbox"/> MSc. Mineral Geosciences (MSc. MGs)	
Course Code:	GW802	
Course Name:	PROPERTIES OF PETROLEUM FLUIDS	
Study Load [ECTS]:	4	
Assumed Knowledge, Prerequisites or Co-requisites:	<ul style="list-style-type: none"> • Knowledge of engineering and chemical thermodynamics/physical chemistry • Understanding of mass and energy conservation relations • Undergraduate calculus and linear algebra • GW701: Numerical Mathematics portion 	
Relationship to other courses within the program:	This course follows GW801-Petrophysics and precedes GW803-Fundamentals of Porous Media Flow: Single Phase Flow. This course provides tools for the quantitative and qualitative analysis of crude oil transport, storage and processing systems. It gives the students insights into various models for predicting/calculating relevant fluid properties under field conditions.	
STAFF		
Lecturer:	Contact details:	
Counterpart Lecturer:	Contact details:	
ESTIMATED STUDY LOAD		
Lecture hrs (contact) [hrs]:	42 (1.5 ECTS)	NOTES: <ul style="list-style-type: none"> • The literature study hours (2.25 ECTS) includes numerical exercises (0.75 ECTS) as well as reading and understanding relevant topics of the course material
Literature Study [hrs]:	63 (2.25 ECTS)	
Examination- Oral [hrs]:	1	
Examination-Written [hrs]:	6	
*Total Hours (ECTS x 28hrs):	112	

*For more information on study load calculation please refer to <https://msingermany.co.in/european-credit-system-ects/>

Course Description:

The increasingly sophisticated drilling and hydrocarbon production technologies require a good knowledge of the properties of fluids that are both reservoir borne and external to the reservoir. The reservoir borne fluids are the hydrocarbons (i.e., oil and gas, and water) and a large variety of mixtures of these fluids, while

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

the external fluids include essentially water and non-Newtonian fluids such as drilling mud. The flow of oil and gas in the reservoir and the production stream is strongly dependent on the thermodynamic behaviour of the fluids. The material properties that are needed to describe the flow and the volumetric behaviour (densities, viscosities, etc.) depend on the pressure, temperature, and composition. The variations of these parameters may lead to considerable modifications of the phase behaviour, which in turn can cause drastic changes of the flow pattern. The thermodynamic behaviour of hydrocarbons classically described in terms of the pressure, volume and temperature (*PVT* behaviour) will be the major concern of this course.

Topics:

- Hydrocarbons and oilfield fluids
- Nomenclature and basic organic chemistry
- Phase behaviour and Equations of state
- Black oil correlations

Learning Outcomes:

After successful completion of this course students will be able to:

- Understand nomenclature of organic compounds
- Understand the properties of hydrocarbons and oilfield fluids
- Understand and have insight in phase behavior of gases and oil mixtures (VLE)
- Understand Equations of state and be able to apply them under field conditions (also knowing drawbacks of various model Equations of State). Be able to contextualize the results.
- Understand Black oil correlations and be able to apply them

Teaching Method:

- Lectures using PowerPoint format for illustrations
- Exercises from the various books used.

Course Contents:

Lecture Content

1. Ahmed, T.H. (2007). Equations of State and PVT Analysis: Applications for Improved Reservoir Modeling. Gulf Publishing Company, Houston (TX) [2nd ed. from 2016]
2. McCain, W.D. (1990). The Properties of Petroleum Fluids. 2nd Edition, PennWell Books, PennWell Publishing Company, Tulsa (OK). [3rd ed. from 2017]

Practical

- Classroom exercises

Conditions for Examination:

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

Course Evaluation:

*For all subtasks, a minimum grade of 5.0 (no round-off) is required, however the final course grade should be at least 5.5 (after round-off)

Course Necessities:

Moodle, MS Teams for lectures and exercises. The student must have access to Microsoft Excel (licensed version 2012 or later).

Textbooks and/or Reference Books available on Moodle:

- Ahmed, T.H. (2007). Equations of State and PVT Analysis: Applications for Improved Reservoir Modeling. Gulf Publishing Company, Houston (TX) [2nd ed. from 2016]
- McCain, W.D. (1990). The Properties of Petroleum Fluids. 2nd Edition, PennWell Books, PennWell Publishing Company, Tulsa (OK). [3rd ed. from 2017]
- Standing, M. B. (1952). Volumetric and Phase Behavior of Oil Field Hydrocarbon Systems. Reinhold Publishing Corp., New York (NY)
- Smith J. M., Van Ness H. C., Abbott M. M. and Swihart M. T. (2018). Introduction to Chemical Engineering Thermodynamics. 8th Edition, McGraw-Hill, Boston (MA).
- Poling, B. E., Prausnitz, J. M. and O’Connell, J. P. (2001). Properties of Gases and Liquids. 5th Edition. McGraw-Hill Education.
- “Properties of Hydrocarbons and Oilfield Fluids “P.L.J. Zitha, P.K. Currie, TA3410

GW804 FUNDAMENTALS OF POROUS MEDIA FLOW: SINGLE PHASE FLOW

General Course Information

GENERAL		
Name of the Study Program:	<input type="checkbox"/> BSc. Geowetenschappen (BSc. Gw) <input checked="" type="checkbox"/> MSc. Petroleum Geoscience & Engineering (MSc. PGsE) <input type="checkbox"/> MSc. Mineral Geosciences (MSc. MGs)	
Course Code:	GW803	
Course Name:	FUNDAMENTALS OF POROUS MEDIA FLOW: SINGLE PHASE FLOW	
Study Load [ECTS]:	5	
Assumed Knowledge, Prerequisites or Co-requisites:	Basic knowledge of physics, calculus, numerical mathematics, ordinary and partial differential equations. Applied skills in the use of MS Office Modules and Matlab Programming.	
Relationship to other courses within the program:	This course is the first engineering based course in the master program and provides fundamentals for applied courses such as multiphase flow, applied reservoir engineering and the field development project.	
STAFF		
Lecturer:	Contact details:	
Counterpart Lecturer:	Contact details	
ESTIMATED STUDY LOAD		
¹ Lecture & Classroom Practical [hrs]:	24	NOTES: <ul style="list-style-type: none"> • N/A if not applicable to the course • Totals should match ECTS load equivalent • Practical includes contact hours and hours required by student to solve practical. • 1: Contact Hours • 2: Self Study Hours
² Literature Study [hrs]:	26	
² Take Home Practical [hrs]:	62	
¹ Practical- Oral Examination [hrs]:	1	
² Examination- Preparation [hrs]:	27	
¹ Examination- Written [hrs]:	0	
Total Hours (ECTS x 28hrs):	140	

*For more information on study load calculation please refer to <https://msingermany.co.in/european-credit-system-ects/>

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

Course Description:

This course generally introduces the principles and methods necessary to quantify single phase flow through saturated porous media in a theoretical as well as practical approach as well as an introduction to pressure transient testing and analysis (the remaining part of pressure transient analysis will be covered in applied reservoir engineering course)

Learning Outcomes:

Students will generally:

- Develop basic knowledge and understanding on single phase flow behavior in saturated porous media, such as:
 - Recognize physical principles (isothermal flow problems (Conservation of Mass, Momentum Balance, Darcy's law) that describe the flow of fluids in porous media.
 - Describe the basic form of Darcy's law and the concept of fluid potential.
 - Describe the coordinate systems typically used to represent fluid flow geometries and their areas of application.
 - Recognize the representations of the general flow equations for single-phase flow of slightly compressible and compressible fluids in terms of vertical, horizontal & radial flow.
- Develop basic knowledge and understanding on pressure transient testing & analysis (single phase) in saturated porous media, such as:
 - Describe the basic principles and objectives of well test analysis.
 - Describe the various methods (build-up, drawdown, Horner, Type Curve) through which pressure transients are initiated in a reservoir.
 - Describe the reservoir parameters that may be derived from a properly designed well test.
- Develop the ability to build models from scratch where single phase flow behavior pressure transient analysis in porous media is modeled under certain assumed conditions, such as:
 - Apply Darcy's law to the description of fluid flow in porous media in terms of vertical, horizontal & radial flow.
 - Permeability models (CK & Klinkenberg)
 - Drawdown, Build Up, Horner plot, Type curves

Teaching Method:

The teaching method for this course implies lecture presentations; take home exercises per group where the exercises should be handed in by documenting the solutions of the exercises (details to follow in instruction document).

Course Contents:

i. Lecture Content:

- i. Isothermal Flow Problems (Mass Conservation Law & Momentum Balance)
- ii. Darcy's Experiment & Law (single phase)
- iii. Permeability Models (CK & Klinkenberg)
- iv. Flow in various directions (vertical, horizontal & radial)
- v. Type of well tests
- vi. Data acquisition
- vii. Typical design
- viii. Superposition & Solutions
- ix. PTA (Drawdown, Build Up, Horner Plot, Type Curve)

j. Practical:

The practical aspect of this course implies exercises which need to be solved (by use of matlab), where the solution is documented and handed, followed by an oral exam.

Conditions for Examination:

Course Evaluation:

*For all subtasks, a minimum grade of 5.0 (no round-off) is required, however the final course grade should be at least 5.5 (after round-off)

Course Necessities:

- MS Teams
- MS Words/ Excel/ PowerPoint
- Matlab

Textbooks and/or Reference Books:

- Reservoir Engineering Handbook, H. Bruining, May 30, 2019
- Norwegian University of Science and Technology, Professor Jon Kleppe Department of Petroleum Engineering and Applied Geophysics, TPG4160 Reservoir Simulation 2018
- Norwegian University of Science and Technology, Professor Jon Kleppe Department of Petroleum Engineering and Applied Geophysics, TPG4150 Reservoir Recovery Techniques 2017
- Well Testing Analysis
- Transient, Semi Steady-State, and Steady-State Flow
- SPE 15278 Dynamic Data Analysis v5.30, C.S.Matthews

**COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -
GW900 FUNDAMENTALS OF POROUS MEDIA FLOW – MULTI PHASE FLOW**

General Course Information

GENERAL	
Name of the Study Program:	<input type="checkbox"/> BSc. Geowetenschappen (BSc. Gw) <input checked="" type="checkbox"/> MSc. Petroleum Geoscience & Engineering (MSc. PGsE) <input type="checkbox"/> MSc. Mineral Geosciences (MSc. MGs)
Course Code:	GW900
Course Name:	FUNDAMENTALS OF POROUS MEDIA FLOW: MULTIPHASE FLOW
Study Load [ECTS]:	5
Assumed Knowledge, Prerequisites or Co-requisites:	Basic knowledge of physics, calculus, and chemistry. Followed course GW803 Fundamentals of Porous Media Flow: Single Phase Flow and course GW802: Properties of Petroleum Fluids Affiliated with using MS Office.
Relationship to other courses within the program:	The contents of this course succeed Fundamentals of Porous Media Flow: Single Phase Flow, and Properties of Petroleum Fluids, and precede Applied Reservoir Engineering.
STAFF	
Lecturer:	Contact details:
Counterpart Lecturer:	Contact details
ESTIMATED STUDY LOAD	
Lecture & Exercises [hrs]:	48
Assignment [hrs]:	40
Exam preparation [hrs]:	24
Written exam [hrs]:	3
Self-study [hrs]:	25
Total Hours (5 ECTS x 28hrs):	140
NOTES: <ul style="list-style-type: none"> • N/A if not applicable to the course • Totals should match ECTS load equivalent • Assignment includes presentation and reporting, incl. preparation 	

*For more information on study load calculation please refer to <https://msingermany.co.in/european-credit-system-ects/>

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

Course Description

This is part two of Fundamentals of Porous Media Flow: Multiphase flow. It builds on the knowledge gained on single phase flow. Key concepts of petroleum engineering are extensively discussed, such as wettability, capillary pressures, relative permeability, sweep efficiency, recovery factors, fractional flow, displacement, flow regimes and Improved/Enhanced Oil Recovery methods.

Learning Outcomes

- Apply the basic surface rock-fluid interaction phenomena to describe two-phase flow in porous media and apply the standard two-phase flow models to laboratory and field observations
- Use the formulation of two-phase flow equations and standard Buckley-Leverett theory to solve oil/water displacement problems
- Describe and understand the limitations of standard solutions for two-phase flow equations
- Relate the two-phase flow theory to oil recovery by processes, with emphasis on how capillary phenomena limits the efficiency of secondary and tertiary oil recovery
- Understand and describe how the efficiency of oil recovery can be improved by using IOR/EOR methods, with simple calculations of recovery factors
- Understand how capillary phenomena limits efficiency of primary and secondary oil recovery
- Application of standard two phase models to field observations.

Teaching Method

The teaching method for this course implies lecture presentations, an assignment that involves reservoir modelling and simulation, a presentation and report about this assignment, and finally a written examination.

Course Contents

0. Introduction
 - a. Course planning & expectations -
 - b. Recap Single Phase Flow -
1. Wettability
 - a. Interfacial tension
 - b. Drainage & imbibition cycles -
 - c. Primary drainage & imbibition
2. Capillary Pressures
 - a. Capillary pressures
 - b. Entrapment model
 - c. Measurements
 - d. Drainage & imbibition curves
 - e. Capillary Pressure in models
3. Relative Permeability
 - a. Permeability -
 - b. Relative permeability
 - c. Hysteresis
 - d. Measurements
 - e. Gas & oil

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

4. Displacement
 - a. Sweep & Recovery Factor
 - b. Fractional Flow
 - c. Displacement
 - d. Flow Regimes
5. IOR & EOR
 - a. Water flooding
 - b. Chemical recovery methods
 - c. Thermal recovery methods

Conditions for Examination

Course Evaluation

*For all subtasks, a minimum grade of 5.0 (no round-off) is required, however the final course grade should be at least 5.5 (after round-off)

Course Necessities

- Laptop with MS office incl. Teams
- CMG software suite

Textbooks and/or Reference Books

- Reservoir Engineering Handbook, H. Bruining, 2019

General Course Information

GENERAL		
Name of the Study Program:	<input type="checkbox"/> BSc. Geowetenschappen (BSc. Gw) <input checked="" type="checkbox"/> MSc. Petroleum Geoscience & Engineering (MSc. PGsE) <input type="checkbox"/> MSc. Mineral Geosciences (MSc. MGs)	
Course Code:	GW901	
Course Name:	Drilling and Completion Engineering	
Study Load [ECTS]:	5	
Assumed Knowledge, Prerequisites or Co-requisites:	Fundamentals of flow in porous media Basic math, physics and chemistry	
Relationship to other courses within the program:	Elementary knowledge of wells, the design process, the construction, the well life cycle, the well components and terminology is essential when working in the oil- and gas industry	
STAFF		
Lecturer:	Contact details:	
Counterpart Lecturer:	Contact details	
ESTIMATED STUDY LOAD		
¹ Lecture & Classroom Practical – 01 [hrs]:	56 hrs 2 x 6 lectures of 4 hrs and 8 hours preparation time	NOTES: <ul style="list-style-type: none"> ● N/A if not applicable to the course ● Totals should match ECTS load equivalent ● Practical includes contact hours and hours required by student to solve practical. ● 1: Contact Hours ● 2: Self Study Hours
² Literature Study-01 [hrs]:	11 hrs	
² Take Home Practical- Hand In Exercises -02 [hrs]:	6 hrs	
Presentation – 01 [hrs]:	12 hrs	
² Examination- Preparation/ Literature Study -01 [hrs]:	50 hrs	
¹ Examination- Oral [hrs]:	N/A	
¹ Examination- Written [hrs]:	5 hrs	
Total Hours (ECTS x 28hrs):	140 hrs	

*For more information on study load calculation please refer to <https://msingermany.co.in/european-credit-system-ects/>

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

Course Description:

The course covers the design, the construction, maintenance during the well life cycle of wells. The emphasis is on practical and operational aspects, but it is grounded upon fundamental principles of Petroleum Engineering. The course consists of lectures, exercises covering casing design, well control, cementing and directional drilling. The course will be completed with a written, open book exam.

Learning Outcomes:

Students will develop:

- Understanding of the process for the construction of wells and the well components
- Assessment and management of risks, environmental, technical and non-technical
- Theoretical prediction of the most important factors in the design of wells
- Mastery of the terminology and concepts of drilling and completions engineering: drilling technology, well-, casing- and drill string design, deviated drilling, drilling dynamics, well control, cementation, completions, interventions, well heads and trees, for both on- and offshore
- Understanding the differences and similarities in the on- and offshore drilling
- Improved presentation skills
- Team work

Teaching Method:

- Lectures using PowerPoint format for illustrations
- Classroom exercises
- Hand in exercise
- Presentation per team
- Self-study

Course Contents:

Lecture contents:

- Well life cycle
- HSE and Contracting
- Well elements
- Drilling fluids and solids control
- Directional drilling
- Casing design
- Cementing
- Well control
- Drilling problems
- Completions and interventions

In the second part of the daily lectures an exercise will be made in class.

No lab experiments will be part of the lectures.

At the start of the allocated time for the courser a small introduction regarding the first exercise will be held. The student group will be divided in three groups. Each group will come up with a solution to a technical problem using a data set, the local regulation and company policy. The students will collaborate to come up with a solution. The solution will be presented by the groups to the class (20 minutes including Q and A).

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

Conditions for Examination:

Course Evaluation:

*For all subtasks, a minimum grade of 5.0 (no round-off) is required, however the final course grade should be at least 5.5 (after round-off)

Course Necessities:

Microsoft Office, scientific calculator, MS Teams

Textbooks and/or Reference Books:

Well Engineering Manual (Moodle)

Applied Drilling Engineering, SPE Textbook Series Bourgoyne, Chenevert, Millheim and Young (Moodle)

Fundamentals of Drilling Engineering, SPE Textbook Series, by Mitchell and Miska

General Course Information

GENERAL		
Name of the Study Program:	<input type="checkbox"/> BSc. Geowetenschappen (BSc. Gw) <input checked="" type="checkbox"/> MSc. Petroleum Geoscience & Engineering (MSc. PGsE) <input type="checkbox"/> MSc. Mineral Geosciences (MSc. MGs)	
Course Code:	GW902	
Course Name:	PRODUCTION GEOLOGY	
Study Load [ECTS]:	4.5	
Assumed Knowledge, Prerequisites or Co-requisites:	<ul style="list-style-type: none"> • Geology: structural geology, sedimentology, lithology, mineralogy • Engineering: Basic knowledge of physical properties of rocks, porous media, and fluids 	
Relationship to other courses within the program:	This course sits in between geology, petrophysics, seismic interpretation, and petroleum engineering	
STAFF		
Lecturer:	Contact details:	
Counterpart Lecturer:	Contact details	
ESTIMATED STUDY LOAD		
¹ Lecture & Classroom Practical [hrs]:	48	NOTES: <ul style="list-style-type: none"> • N/A if not applicable to the course • Totals should match ECTS load equivalent • Practical includes contact hours and hours required by student to solve practical. • 1: Contact Hours • 2: Self Study Hours
² Literature Study-01 [hrs]:	12	
² Take Home Practical- Model Exercise [hrs]:	23	
¹ Practical- Presentation/ Feedback [hrs]:	0	
² Examination- Preparation [hrs]:	40	
¹ Examination- Oral [hrs]:	0	
¹ Examination- Written [hrs]:	3	
Total Hours (4.5 ECTS x 28hrs):	126	

Course Description:

This course seeks to bridge the gap between geology and petroleum engineering. Many aspects of the day-to-day work of the production geologist are covered. Both static (volumetric) and dynamic (fluid flow) modeling are addressed. We will start off by learning the tools of the trade: well logs, both open hole and

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

production logging tools; cross sections; maps; we then proceed by calculation of static volumes (STOIIP or GIIP); reservoir characterization; well planning; and assessment of remaining hydrocarbons.

Learning Outcomes:

At the end of the course, the student will have a good overview of the tools, techniques, and way of thinking needed for the assessment of volumes of hydrocarbon fields. In addition, the three-dimensional insight into the geometry of hydrocarbon fields, combined with knowledge of fluid flow through heterogeneous rocks will allow the student to make field development plans or redevelopment plans.

Teaching Method:

Lecture presentations, exercises, home assignment.

Course Contents:

a. Lecture Content

Well logs, both open hole and production logging tools; cross sections; maps; calculation of static volumes (STOIIP or GIIP); reservoir characterization; well planning; and assessment of remaining hydrocarbons.

b. Practical

Every student will make a (individual) home assignment in the form of a written paper.

Conditions for Examination:

Course Evaluation:

*For all subtasks, a minimum grade of 5.0 (no round-off) is required, however the final course grade should be at least 5.5 (after round-off)

Course Necessities:

- MS Teams
- MS Word/ PowerPoint/Excel
- Pencil and colour pencils, ruler, protractor
- Calculator
- Laptop with Petrel software (provided by AdeK)

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

Textbooks and/or Reference Books:

- Oil Field Production Geology (Shepherd, 2009 AAPG M91)
- AAPG Development Geology Reference Manual
- DPS20 Geology in Petroleum Production (1985, Dikkers)
- Geological Interpretation of Well Logs (1996, Rider)
- Petroleum Geoscience (2004, Gluyas & Swarbrick)

GW903 APPLIED RESERVOIR ENGINEERING

General Course Information

GENERAL		
Name of the Study Program:	<input type="checkbox"/> BSc. Geowetenschappen (BSc. Gw) <input checked="" type="checkbox"/> MSc. Petroleum Geoscience & Engineering (MSc. PGsE) <input type="checkbox"/> MSc. Mineral Geosciences (MSc. MGs)	
Course Code:	GW903	
Course Name:	Applied Reservoir Engineering	
Study Load [ECTS]:	5.5	
Assumed Knowledge, Prerequisites or Co-requisites:	<ul style="list-style-type: none"> • Sedimentology and petroleum geology • Properties of Petroleum Fluids • Single and multi-phase flow in porous media 	
Relationship to other courses within the program:	Preceding course of fundamentals of porous media flow- Single and Multiphase flow (GW803 & GW 900)	
STAFF		
Lecturer:	Contact details:	
Counterpart Lecturer:	Contact details	
ESTIMATED STUDY LOAD		
¹ Lecture & Classroom Practical [hrs]:	44	NOTES: <ul style="list-style-type: none"> • N/A if not applicable to the course • Totals should match ECTS load equivalent • Practical includes contact hours and hours required by student to solve practical. • 1: Contact Hours • 2: Self Study Hours
² Literature Study-01 [hrs]:	17	
² Take Home Assignments [hrs]:	20	
¹ Practical-Presentation/Report and Feedback [hrs]:	40	
² Examination- Preparation [hrs]:	30	
¹ Examination- Oral [hrs]:	N/A	
¹ Examination- Written [hrs]:	3	
Total Hours (ECTS x 28hrs):	154	

*For more information on study load calculation please refer to <https://msingermany.co.in/european-credit-system-ects/>

Course Description:

This course integrates the learnings from Petroleum Geology, Rock-fluid physics, Petroleum Fluid properties and illustrates how they are used to understand and predict the behavior and performance of oil and gas reservoirs during primary, secondary and tertiary hydrocarbon recovery.

The course will start with revisiting material balance calculations stressing general principles and their applications for the analyses of oil and gas reserves. Next the course will concentrate on decline curve analysis and well testing, again starting with basic principles and illustrating its applications for estimating reservoir parameters. The course will proceed with Improved Oil Recovery (IOR) focusing first on water flooding. Both the microscopic and macroscopic (up to reservoir scale) aspects of water flooding will be discussed to some depth. Also some key subsurface aspects in developing a gas field will be explained.

Finally, the fundamentals of Enhanced Oil Recovery (EOR) will be introduced followed by the treatment of the most important chemical, thermal and gas injection EOR methods. Assignments covering several topics will be proposed to students where they will integrate the knowledge acquired in the course and further deepen their understanding of the topics treated.

Learning Outcomes:

The main goal of this course is to develop an understanding of the reservoir engineering methodology that is required to predict and optimize recovery from petroleum reservoirs and gain mastery of the Reserves Estimation, Well Testing, Improved Oil Recovery, Gas Recovery and Enhanced Oil Recovery Methods.

At the end of this course students should be able to:

- Describe the principles and limitations behind the material balance equation and identify the data that is needed to apply the material balance equation and the uncertainties associated with collecting such data
- Identify and explain the different mechanisms influencing the production of hydrocarbons and how they are incorporated in the material balance analysis
- Conduct material balance analysis calculations
- Perform Decline Curve Analysis and Reserves Estimations
- Understand and apply Pressure Transient Analysis concepts, equations and procedures
- Understand the impact of rock-fluid properties on secondary and tertiary recovery and apply them to the most common IOR and EOR processes
- Understand key subsurface aspects of development of a gas field
- Apply the EOR and IOR concepts and quantify the corresponding incremental recovery factor
- Understanding the principles and selection of IOR/EOR screening and selection

Teaching Method:

The course will be based upon lectures where students will receive an explanation on a particular topic (about 3 hours) and then they are required to work on exercises to test their understanding. In addition, during lectures take home assignments will be given to the students to examine that the lecture material is understood. A mini project that consists of solving a reservoir engineering problem will be given at the end of the lecture series to illustrate the application of the concepts learned in class. Students will be directed to

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

the literature to complement the understanding of the subjects. The mini project will be evaluated by a presentation and written report.

Course Contents:

1. Lecture Content:

- Concept of drive mechanisms
- Material Balance analysis in Oil Reservoirs and in Gas Reservoirs
- Decline Curve Analysis
- Principles of Well Testing and Applications of Well Testing Analyses
- Water flooding of clastic reservoirs: microscopic aspects
- Water flooding of clastic reservoirs: macroscopic aspects
- Key subsurface aspects for developing gas reservoirs
- Enhanced Oil Recovery: polymer and surfactant flooding
- Enhanced Oil Recovery: gas flooding
- Enhanced Oil Recovery: Thermal Recovery

2. Practical:

- Exercises during lecture
- Short take away assignments
- Mini project at the end

Conditions for Examination:

Course Evaluation:

*For all subtasks, a minimum grade of 5.0 (no round-off) is required, however the final course grade should be at least 5.5 (after round-off)

Course Necessities:

- MS Teams

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

- MS Words/ PowerPoint/Excel

Textbooks and/or Reference Books:

Books:

- L.P. Dake, Fundamentals of Reservoir Engineering
- Charles Marle, Multiphase Flow in Porous Media
- G. Paul Willhite, Waterflooding
- Larry W. Lake, Enhanced Oil Recovery

General Course Information

GENERAL		
Name of the Study Program:	<input type="checkbox"/> BSc. Geowetenschappen (BSc. Gw) <input checked="" type="checkbox"/> MSc. Petroleum Geoscience & Engineering (MSc. PGsE) <input type="checkbox"/> MSc. Mineral Geosciences (MSc. MGs)	
Course Code:	GW904	
Course Name:	Introduction to Offshore Production Systems	
Study Load [ECTS]:	4	
Assumed Knowledge, Prerequisites or Co-requisites:	As an introduction course, no specific prior knowledge is required for this course. It is assumed that students have an academic background and skills ensued from it.	
Relationship to other courses within the program:	This course is fundamental as an introduction to a more complete understanding of the offshore oil and gas production systems. It complements the Marine Pipelines and Subsea Engineering (GW1002) and Offshore Structures Engineering (GW909) courses, where a more in-depth understanding of several aspects are provided.	
STAFF		
Lecturer:	Contact details:	
Counterpart Lecturer:	Contact details	
ESTIMATED STUDY LOAD		
¹ Lecture[hrs]:	28	NOTES: <ul style="list-style-type: none"> • N/A if not applicable to the course • Totals should match ECTS load equivalent • Practical includes contact hours and hours required by student to solve practical. • 1: Contact Hours • 2: Self Study Hours
² Literature Study-01 [hrs]:	24	
² Report & Presentation[hrs]:	30 (report) 14 (presentation)	
¹ Practical- Presentation/ Feedback [hrs]:	4	
² Examination- Preparation[hrs]:	51	
¹ Examination- Oral [hrs]:	N/A	
¹ Examination- Written [hrs]:	3	
Total Hours (ECTS x 28hrs):	154	

*For more information on study load calculation please refer to <https://msingermany.co.in/european-credit-system-ects/>

Course Description:

This course will provide students with an introduction to the structures and facilities required for the development of offshore oil and gas fields. Students are made aware of the diversity and range of building

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

blocks potentially applicable in the offshore field development of these hydrocarbon reservoirs and the facets involved in the (preliminary) design of structures for offshore production. This course will provide general knowledge of this field, allowing you to work with experts in the offshore engineering industry.

Course Contents:

- k. The following subjects will be explained through the lecture content:
- Offshore Engineering, an overview: History, trends and challenges
 - Offshore environment: wind, wave and climate conditions (metocean)
 - Actions on offshore structures: different acting loads and translation to design choices
 - Temporary and permanent offshore installations: overview of installations
 - Platforms: substructures and topsides of fixed and floating offshore structures
 - Offshore drilling, subsea installations, export facilities and unmanned wellhead platforms
 - Stages in a structure's life cycle: from planning and design to decommissioning
 - HSE aspects: focus on Safety
 - Examples of different projects
- l. Report & Presentation:
Students will write a report on choosing an ideal offshore production system for a case study regarding a (fictional) hydrocarbon field off the coast of Suriname. This will be concluded with a presentation and interactive discussion where the students can defend their choices. The students are expected to apply gained knowledge and are challenged to further explore certain aspects in order to provide a more complete picture.

Learning Outcomes:

After completing this course, students are expected to:

- Be familiar with the nomenclature and the several offshore concepts in the offshore oil and gas sector
- Have an overview of the offshore developments and challenges.
- Understand the offshore environment and their actions on the offshore structures.
- Have knowledge of different types of offshore structures; main characteristics, pro's & con's
- Understand the design principles of different offshore platforms, their substructures and topsides.
- Obtain general knowledge of the different aspects of offshore drilling, subsea installations and flow lines
- General knowledge of the different stages of an offshore oil and gas field development
- Obtain general knowledge of different aspects of fabrication, installation and decommissioning
- Obtain general knowledge of different aspects of safety on offshore projects.
- Be able to choose a structure depending on several characteristics of an offshore hydrocarbon field.

Teaching Method:

The lecture content will be explained through lecture presentations. In order to have open and in-depth discussions, students are expected to read the provided lecture notes before attending the lectures. The report and presentation will be done either individually or in groups of students; to be decided based on the amount of attending students. Students will be challenged to provide feedback and deal with received feedback.

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -
Conditions for Examination:

Course Evaluation:

A minimum grade of 5.0 is mandatory for all partial grades. The total grade will be calculated as per the table below and should be ≥ 5.5

Course Necessities:

Basic Microsoft Office

Course Material:

Lecture notes will be provided two weeks before the start of the course.

**COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -
GW905 PETROLEUM GEOLOGY OF THE CARIBBEAN REGION**

General Course Information

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GENERAL INFORMATION	
Name of the Study Program:	<input type="checkbox"/> BSc. Geowetenschappen (BSc. Gw) <input checked="" type="checkbox"/> MSc. Petroleum Geoscience & Engineering (MSc. PGsE) <input type="checkbox"/> MSc. Mineral Geosciences (MSc. MGs)
Course Code:	GW905
Course Name:	Petroleum Geology of the Caribbean Region
Lecturer:	Prof. Dr. H. Doust
Counterpart Lecturer:	Dheeraj Biharie, MSc
Academic Year:	2024/2025
Study Load [ECTS]:	7.5
Study Year:	2
Grade Basis:	The course grade will be based on: 1: In-class exercises, approximately 20 during lecture periods, which will address the concepts presented in lectures: 20% of final grade. 2: Practical interpretation assignments, to be carried out in syndicates of 2 throughout the course and reported on to lecturers in short presentations: 40% of final grade 3: One written examination, 40% of final grade, end week 8
Pass Marks:	Final grade must be 5.5 or more (after round-off). For individual tasks and answers a minimum of 5.0 will be expected
Final Grade Calculation:	Class exercises: 20%, practical projects: 40%, examination: 40%
Target Date & Time:	<ul style="list-style-type: none"> Class exercises are to be discussed with or submitted to the lecturer or counterpart lecturer before the following lecture so that timely feed-back can be presented. Practical assignments will be presented via PPT orally to lecturer and others in a dedicated session at the end of the time allocated, 12 days for each project. On the same day a Word report with illustrations will be submitted to lecturers.
Email Address/ Platform For Submission:	Lecturer: harrydoust@hotmail.com Counterpart lecturer: Dheeraj Biharie Email: dhBiharie@staatsolie.com Phone: +597 8764538
Submission Format*:	<input type="checkbox"/> Presentation <input type="checkbox"/> Paper <input type="checkbox"/> Essay <input type="checkbox"/> Report <input type="checkbox"/> Spreadsheet <input type="checkbox"/> Other
Other Instructions:	Failure to submit work on the designated day will be penalized by a 5% reduction in mark. After 1 week this will rise to 10%. Neatness and clarity are highly regarded and will be rewarded

*more options are allowed

For more information on study load calculation please refer to <https://msingermany.co.in/european-credit-system-ects/>

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

A review of the main sedimentary basin types from around the World, their evolution through cycles in

Teaching Method:

The course will comprise lecture presentations, literature study, hand-in exercises, extended assignments, in-class and take-home exercises and practical demonstration of learnings in the field.

Course Content:

Summary of Lecture Content:

- The geology and development of exemplary sedimentary cycle types and basins worldwide
- The geology and development of sedimentary basins in the Caribbean area, including the Gulf of Mexico and Guianas.
- The essential parameters and processes that combine to produce petroleum systems
- Risk and uncertainty evaluation in exploration

The course will review the main characteristics of sedimentary basin development by looking at international and Caribbean case studies. Much of the course will be dedicated to reviews of sedimentary basin development, approached from the perspective of the tectono-stratigraphic cycles of which they are composed: Such cycles include faulted rifts, passive margins, carbonate platforms, foreland troughs and active volcanic arc-related basins. The approach will be through study of characteristic basin cycles and the sediments they contain, with considerable attention placed on the interplay between stratigraphy and tectonics. Particular attention will be placed on development of skills related to the interpretation of basin stratigraphy from seismic data.

It will provide a summary of the key geological principles, concepts and processes related to sedimentary basin development that impact on oil and gas distribution. By highlighting well-described working petroleum systems from around the world and their associated plays, it will evaluate representatives in the Caribbean area. Methods for regional study of the elements essential for successful exploration – the source rocks, reservoirs, seals and trapping structures as well as the subsurface processes that lead to generation, migration and retention of hydrocarbons will be reviewed. A selection of prolific Caribbean basins will be analysed to demonstrate the value of using knowledge of cycles in exploration to evaluate basin hydrocarbon prospectivity.

With the help of in-class exercises and extended basin interpretation assignments students will **Learn how to MANAGE the geological risks** and uncertainties associated with the prediction of sedimentary sequences and how this is reflected in the search for petroleum resources.

Practical exercises and assignments:

- Literature Study: Review of lectures and write-up of notes taken during lectures plus selected publications (see list below)
- Hand in exercises: Several mainly short in-class exercises will be carried out during and following each lecture. These will include mapping, basin analysis and risk/uncertainty exercises, as well as methods for predicting sedimentary facies from seismic. (CG to said in supervision.
- Extended assignments: participants in groups of 2 will work on the following interpretation projects:
 - Great South Basin: Workflow methods involved in evaluation of prospectivity in a frontier area for exploration, using regional 2D seismic and well data. Objective – how to tackle evaluation with little data and decide on what further work is justified

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

- Alucard: integration of 2D seismic and well data from a basin to identify and describe the main stages in basin history and development and prepare a plan to evaluate petroleum prospectivity: Objective – recognizing and understanding basin evolution cycles
- Shangri-La: Use of limited seismic data to compile an exploration license-application to local government based on defined contract terms and simple economics, Objective: Understanding the process of converting predictions into action!
- Erebus Basin: evaluation of potential sites for CCS (Carbon Capture and Storage) in saline formations in a basin with a complex geological history
- Petroleum system analysis: Description of a selected productive basin in the Caribbean area, its geological development and structural-stratigraphic relations, followed by an analysis of its petroleum system(s) and play development. **Optional extra*
- Possible additional exercise on core description to be provided by Staatolie. (optional extra).
- Field excursion: Six-day examination of stratigraphy and structure of the Trinidad fold belt, led by staff from UWI and AAPG Young Professionals. Objective - to provide field observation and description experience, bringing together many of the concepts presented in the lectures and observation of active petroleum system. It provides some of the participants with their first opportunity to see the geometry and scale provided by outcrops of the rocks they study in the Suriname subsurface.

Learning Outcomes:

Essentially, the course aims to expand the horizon of students by exposing them to the variety of geological situations in which petroleum can be found worldwide and especially in the Caribbean area.

Learning Outcomes:

- The course will enable participants to appreciate the practical value of integrating the geological principles of sedimentology/sedimentary processes (GW703) and structural geology/tectonics (GW702) in relation to sedimentary basin evolution and petroleum system development. By exposing Earth Science graduates to the variety of geological basins developed worldwide it will help them to understand how geological components and processes combine in the production of subsurface resources.
- Participants will gain broad perspectives on the composition of sedimentary basins worldwide in a context that will directly support the different aspects and scales of their current activities and facilitate knowledge-building in their careers. They will learn details of the geology and hydrocarbon occurrences in Caribbean basins.
- It will enable students to place the geology of Suriname and adjacent areas in a wider, more global context, substantially enhancing understanding of stratigraphic patterns in sedimentary basins. This will enable them to place their growing geological experience in a wider context and allow them to make more realistic and confident predictions of the subsurface. Students will develop practical skills in conducting basin evaluation using seismic data in the Caribbean area and elsewhere.
- Group studies involving practical application of the learnings will provide participants with opportunities to exercise their technical evaluation abilities, team working and clear, concise and timely reporting skills.

Course Evaluation:

*For all subtasks, a minimum grade of 5.0 (no round-off) is required, however the final course grade should be at least 5.5 (after round-off)

Course Necessities:

Basic Microsoft Office, stationary (paper, coloured pencils, transparent A4 and paper, ruler, calculator), access to scanner and printer.

A selection of textbooks and reference publications:

Gluyas, J. and Swarbrick, R. (2008). Petroleum Geoscience. Blackwell, 359pp
Allen, P.A. and Allen, J.R. (2005). Basin analysis. Blackwell, 549pp

Tankard, A.J. et al (eds) 1998. Petroleum basins of South America. AAPG Memoir 62

Bartolini, C. et al (2003) (ed). The Circum-Gulf of Mexico and the Caribbean, hydrocarbon habitats, Basin Formation, and Plate Tectonics. AAPG Memoir 79

Bernardo, L. M and Bartolini, C.: 2015. Petroleum Source Rock Analysis in the Western Caribbean Region; an overview. In AAPG Memoir 108, Bartolini, L.M. and Mann, P (eds): Petroleum geology and potential of the western Colombian Caribbean margin, 587 – 614

Escalona, A and Mann, P. 2011. Tectonics, basin subsidence mechanisms, and paleogeography of the Caribbean-South American plate boundary zone. Marine and Petroleum Geology 28: 8-39.

Geological Society (2009) The origin and evolution of the Caribbean Plate. Geol. Soc. London Special Publication 328

Moonan, X and Harrypersad, S. 2020. onshore Exploration Drilling Success in Southern Basin, Trinidad. Search and Discovery Article #11293

Nemcok, M. et al. 2015: Development history of the southern terminus of the Central Atlantic; Guyana–Suriname case study, in Transform margins: development, controls and petroleum systems. Geol. Soc. Special Publication 431. <http://sp.lyellcollection.org>

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

Pindell, J., Kennan, L., Stanak, K.P. and Maresch, W.J. 2006. Foundations of Gulf of Mexico and Caribbean evolution: Eight controversies resolved, *Geologica Acta* 4 (1-2): 303-341

Reuber, K., Pindell, J. and Horn, B.W. 2016. : Demerara Rise, offshore Suriname: Magma-rich segment of the Central Atlantic Ocean, and conjugate to the Bahamas hot spot. Interpretation T31-T45

Course Schedule (Modular):

Lectures and individual in-class exercises

Lectures will be delivered in person (week 1) by HD and on-line (other weeks) by HD and/or CG. The subjects and list of lectures can be seen above and in the modular programme below.

Approximately 20 mainly short in-class exercises will be carried out during or following lectures in weeks 1 to 5. These will include mapping, basin analysis and risk/uncertainty exercises, with an emphasis on methods for predicting sedimentary facies from seismic data. They will be supervised by lecturer or counterpart as appropriate. There will be no weighting, except in cases where the exercise is multi-stage. As there will be feed-back on the exercises, timely submission will be an essential condition for receiving a mark.

The exercises will be carried out on paper in most cases, so if working from home students will need to scan-in or photograph their answer for submission to lecturer / counterpart.

Other considerations

- The exercises are individual: You will be expected to work on them by yourself.
- All exercises are on Powerpoint and will be loaded and downloadable from Moodle, but paper copies will be made available in class as appropriate.
- The exercises will include all necessary instructions, but these will be elaborated orally by lecturer / counterpart in class during the lecture.
- You will need to have a set of coloured pencils, ruler, eraser, sellotape, tracing paper and graph paper.
- Make sure your name and student number are marked on each exercise answer.

Practical Interpretation assignments (see description above)

In sessions of 12hrs each, participants in groups of 2 will work on interpretation assignments designed to develop technical, co-operative and reporting skills, involving ability to concentrate on important issues and inventively work to produce a quality document, see the Course Description. The assignments will be divided into a number of stages and at the end of each, groups will be responsible for reporting progress to lecturer and/or counterpart.

Lecturer and counterpart will explain the objectives of each study and the tasks involved. Most will involve analysis of data presented, including interpretation of seismic and wells, and preparation of an exploration strategy.

Reporting will be by (i) in an oral PPT presentation to lecturers and others of 15 – 20 minutes, summarizing the work done and the main conclusions, (ii) in an illustrated Word document in which the results are presented. For both the presentation construction should include:

Title, index, objectives, introduction, methodology, interpretation, uncertainties, discussion of results, conclusions.

Other considerations

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

- Reporting must be smart, neat and concise, making efficient use of space and graphic illustrations.
- The PPT presentation should be well-rehearsed and smooth with a logical build-up. Team members should contribute equally orally. Time keeping is essential. There will be 5 minutes for questions
- We are looking for insightful, creative thinking based on the knowledge and ideas presented in the lectures and application of novel techniques.

General Course Information

GENERAL		
Name of the Study Program:	<input type="checkbox"/> BSc. Geowetenschappen (BSc. Gw) <input checked="" type="checkbox"/> MSc. Petroleum Geoscience & Engineering (MSc. PGsE) <input type="checkbox"/> MSc. Mineral Geosciences (MSc. MGs)	
Course Code:	GW907	
Course Name:	PETROLEUM RESOURCES	
Study Load [ECTS]:	4.5	
Assumed Knowledge, Prerequisites or Co-requisites:	Basic knowledge of geology, exploration methods (seismic, drilling, production). Basic computer skills (in particular Excel spreadsheets).	
Relationship to other courses within the program:	This course links knowledge of other courses (e.g. seismic, geology, production methods) into an economic model.	
STAFF		
Lecturer:	Contact details:	
Counterpart Lecturer:	Contact details	
ESTIMATED STUDY LOAD		
¹ Lecture & Classroom Practical [hrs]:	9*4=36	NOTES: <ul style="list-style-type: none"> • N/A if not applicable to the course • Totals should match ECTS load equivalent • Practical includes contact hours and hours required by student to solve practical. • 1: Contact Hours • 2: Self Study Hours
² Literature Study [hrs]:	4	
² Take Home Practical- Hand In Report [hrs]:	47	
² Examination- Preparation[hrs]:	36	
¹ Examination- Oral [hrs]:	N/A	
¹ Examination- Written [hrs]:	3	
Total Hours (ECTS x 28hrs):	4.5*28=126	

*For more information on study load calculation please refer to <https://msingermany.co.in/european-credit-system-ects/>

GENERAL	
Name of the Study Program:	<input type="checkbox"/> BSc. Geowetenschappen (BSc. Gw) <input checked="" type="checkbox"/> MSc. Petroleum Geoscience & Engineering (MSc. PGsE) <input type="checkbox"/> MSc. Mineral Geosciences (MSc. MGs)

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

Course Code:	GW907	
Course Name:	Petroleum Resources	
Study Load [ECTS]:	4.5	
Assumed Knowledge, Prerequisites or Co-requisites:	Basic knowledge of geology, exploration methods (seismic, drilling, production). Basic computer skills (in particular Excel spreadsheets).	
Relationship to other courses within the program:	This course links knowledge of other courses (e.g. seismic, geology, production methods) into an economic model.	
STAFF		
Lecturer:	Contact details:	
Counterpart Lecturer:	Contact details	
ESTIMATED STUDY LOAD		
¹ Lecture & Classroom Practical [hrs]:	7*4=32	NOTES: <ul style="list-style-type: none"> • N/A if not applicable to the course • Totals should match ECTS load equivalent • Practical includes contact hours and hours required by student to solve practical. • 1: Contact Hours • 2: Self Study Hours
² Literature Study [hrs]:	12	
² Take Home Practical- Hand In Report [hrs]:	47	
² Examination- Preparation[hrs]:	36	
¹ Examination- Oral [hrs]:	N/A	
¹ Examination- Written [hrs]:	3	
Total Hours (ECTS x 28hrs):	4.5*28=126	

*For more information on study load calculation please refer to <https://msingermany.co.in/european-credit-system-ects/>

Course Description:

The training course will address the key success factors impacting exploration for oil and gas: Oil and gas price, economics (NPV and EMV calculations) hydrocarbon trap formation: the presence of Trap, Charge and Reservoir based on an understanding of the regional setting.

Finally, all aspects will be brought together to assess the risk of the prospect: Building of an economic model, the sources of the various parameters (price, volume, production rates, engineering costs and operating costs).

- Regional setting - understanding the regional geology and its impact on local prospectivity
- Charge - presence and effectiveness of source rock, expulsion and migration
- Reservoir - presence and effectiveness of reservoir based on well and seismic data

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

- Trap - assessing structural aspects of trap and trap formation, together with the presence and quality of seal

Prospect evaluation and risking - Bringing all geological aspects together and assessing uncertainty and risk of the prospect.

Learning Outcomes:

By the end of the module, the candidate will be able to demonstrate that he/she is able to assess risks, to build an economic model and to arrive at sound commercial decisions.

Teaching Method:

The course will consist of lectures alternating with exercises and each student will have to prepare a written report on a relevant topic. *Note: Please use report template which is placed on Moodle.*

Course Contents:

- Introduction; Visit to the Ghawar Field
Traps; Visit to Mushroom
Porosity/Fault seal; Visit to Bulgaria
Plate tectonics, EMV; visit to Guinea Bissau, possibly Namibia
Recovery; visit to Calcutta
Recovery, Resources classification; Staatsolie procedures
Production, Prices, Process and Conclusion
- After the lectures the students will be supplied with additional reading (pdf), the written exam will include questions related to these additional papers.
- Project addressing prospectivity, terms and conditions.

Conditions for Examination:

Course Evaluation:

*For all subtasks, a minimum grade of 5.0 (no round-off) is required, however the final course grade should be at least 5.5 (after round-off)

Course Necessities:

Basic Microsoft Office (Excel, Powerpoint and Word), Prospector Light

Textbooks and/or Reference Books:

At the end of the course students will be supplied with a selection of papers. The written exam will include questions on these papers.

General Course Information

GENERAL		
Name of the Study Program:	<input type="checkbox"/> BSc. Geowetenschappen (BSc. Gw) <input checked="" type="checkbox"/> MSc. Petroleum Geoscience & Engineering (MSc. PGsE) <input type="checkbox"/> MSc. Mineral Geosciences (MSc. MGs)	
Course Code:	GW908	
Course Name:	Production Systems and Engineering	
Study Load [ECTS]:	5.5	
Assumed Knowledge, Prerequisites or Co-requisites:	<ul style="list-style-type: none"> GW803: Familiarity with basic Darcy flow concepts Basic single and multiphase flow in pipelines (vertical and horizontal) GW802: Properties of Petroleum Fluids GW901: Drilling Engineering 	
Relationship to other courses within the program:	This course follows GW802 Properties of Petroleum Fluids, GW803 Single Phase Flow, GW903 Reservoir Engineering, GW 901 Drilling Engineering and precedes GW1001-Production Optimization	
STAFF		
Lecturer:	Contact details:	
Counterpart Lecturer:	Contact details	
ESTIMATED STUDY LOAD		
¹ Lecture & Classroom Practical [hrs]:	60	NOTES: <ul style="list-style-type: none"> N/A if not applicable to the course Totals should match ECTS load equivalent Practical includes contact hours and hours required by student to solve practical. 1: Contact Hours 2: Self Study Hours
² Literature Study-01 [hrs]:	20	
² Hand In Exercises [hrs]:	24	
¹ Practical- Presentation/ Feedback [hrs]:	11	
² Examination- Preparation/ Literature Study-02 [hrs]:	36	
¹ Examination- Oral [hrs]:	N/A	
¹ Examination- Written [hrs]:	3	
Total Hours (ECTS x 28hrs):	154	

*For more information on study load calculation please refer to <https://msingermany.co.in/european-credit-system-ects/>

Course Description:

This course is programmed to equip the student with the basic knowledge on understanding the various components of a production system, applying the physical concepts to diagnose typical issues and optimize

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

the design of wells and production systems. To do so, a multi angle approach is required by the student in order to integrate all necessary information and or assumptions to complete the task.

Learning Outcomes:

After been exposed to this course, students will have built their knowledge and will be able to demonstrate the understanding of the following:

- **Production System:**
 - Definition of Production System
 - Identification and interrelation of various components of the Production System
- **Reservoir and Tubing Performance:**
 - Concept of Nodal Analysis*
 - Describing Inflow and Outflow performance curves*
- **Selection and Design of Artificial Lift:**
 - The need of artificial lift and most common artificial lift types
- **Perforating:**
 - Perforation Technology
 - Perforation Design*
- **Sand Control :**
 - The necessity for Sand Control
 - Types of common Sand Control methods
 - Sand Control Design
- **Multiphase flow in wells and pipelines:**
 - Fundamental aspects of two-phase flow in wells and pipelines
 - Characterization of various flow regimes
 - Slip and hold up definition
 - Multiphase pipeline design*
- **Surface Gathering Systems:**
 - Oil and Gas production gathering systems
 - Basic Analysis of surface gathering systems
 - Intermediate Analysis of surface gathering systems*
- **Environmental concerns in Petroleum Engineering**
*PIPESIM Exercises

Teaching Method:

- Lectures using PowerPoint format for illustrations
- Exercises (PIPESIM and Excel)
- Student presentations

Course Contents:

- d. Lecture Content:
 - i. Production System
 - ii. Reservoir and Tubing Performance
 - iii. Selection and Design of Artificial Lift
 - iv. Perforating
 - v. Sand Control

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

- vi. Multiphase flow in wells and pipelines
- vii. Surface Gathering Systems
- viii. Environmental concerns in Petroleum Engineering
- ix. PIPESIM Exercises

e. Practical:

- i. Literature Study
- ii. Classroom exercises
- iii. Hands on exercises (software)

Conditions for Examination:

Course Evaluation:

*For all subtasks, a minimum grade of 5.0 (no round-off) is required, however the final course grade should be at least 5.5 (after round-off)

Course Necessities:

Moodle, MS Teams for lectures, Basic Microsoft Office, PIPESIM2017 to be provided by Lecturer.

Textbooks and/or Reference Books:

- “Petroleum Production Systems “ – M.Economics et al
- “ Petroleum Engineering Handbook for the Practicing Engineer “ – M.A. Mian
- “Modelling and Optimisation of Oil and Gas Production Systems – J.D. Jansen and P.K. Currie

General Course Information

GENERAL		
Name of the Study Program:	<input type="checkbox"/> BSc. Geowetenschappen (BSc. Gw) <input checked="" type="checkbox"/> MSc. Petroleum Geoscience & Engineering (MSc. PGsE) <input type="checkbox"/> MSc. Mineral Geosciences (MSc. MGs)	
Course Code:	GW909	
Course Name:	OFFSHORE STRUCTURES ENGINEERING	
Study Load [ECTS]:	6.5	
Assumed Knowledge, Prerequisites or Co-requisites:	It is a prerequisite that students have completed the common foundational courses covering geology, single & multiphase flow and the preceding Introduction to Offshore Production Systems course GW904.	
Relationship to other courses within the program:	The course builds on the general knowledge gained in the preceding course GW904 (Introduction To Offshore Production Systems) on structures and facilities required for the development of offshore oil and gas fields. In the present course students will broaden, deepen and apply their knowledge, for fixed structures and deepwater production facilities. The course prepares students for further required building blocks in offshore field development for hydrocarbon extraction and production. Completing this course is a requirement for entering the next OE based track course GW 1002 Marine pipelines and subsea engineering.	
STAFF		
Lecturer:	Contact details:	
Counterpart Lecturer:	Contact details	
ESTIMATED STUDY LOAD		
¹ Lecture & Classroom Practical [hrs]:	36	NOTES: <ul style="list-style-type: none"> • N/A if not applicable to the course • Totals should match ECTS load equivalent • Practical includes contact hours and hours required by student to solve practical. • 1: Contact Hours • 2: Self Study Hours
² Literature Study-01 [hrs]:	28	
² Assignment - ¹ Presentation[hrs]:	42 + 4	
² Examination- Preparation/ Literature Study-02 [hrs]:	41	
¹ Examination- Written [hrs]:	3	
Total Hours (ECTS x 28hrs):	154	

*For more information on study load calculation please refer to <https://msingermany.co.in/european-credit-system-ects/>

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

Course Description:

This course provides students with an in-depth overview of the engineering requirements for offshore structures and facilities required for the development of offshore oil and gas fields.

Learning Outcomes:

Upon successful completing this course students will be able to:

- Work in a multi-discipline project team and provide engineering inputs and reviews regarding offshore structures requirements
- Evaluate the layout and design of structures for fixed hydrocarbon production facilities
- Evaluate the layout and design of structures for deepwater hydrocarbon production facilities (floating structures)
- Provide inputs and assist with technical evaluations of mobile offshore units for hydrocarbon exploration and production drilling
- Determine selection criteria and design drivers for floating, fixed and hybrid offshore structures
- Prepare a Basis for Design for an offshore structure for an offshore oil and gas field development
- Participate in safety engineering studies for offshore production facilities
- Liaise at professional level with offshore structures design consultants and contractors, with specific focus on design, fabrication, transport, installation and safe operations of structures
- Assist offshore asset managers in the decision-making process for offshore oil and gas developments

Teaching Method:

- Academic lectures presented in classroom. A structured and thematic program is followed for knowledge transfer and cultivation of understanding. Students are stimulated to further explore and research the subjects taught.
- Two assignments where knowledge of this course is applied on fixed structures and floating structures

Course Contents:

f. **Contents:**

- Fixed structures: Design, Fabrication, Transport, Installation and Commissioning
- Floating Structures: Design, Fabrication, Transport, Installation and Commissioning
- Topsides and processing options
- Safety and economical considerations

g. **Assignments:** Students perform two assignments for learning how to obtain their understanding (through design) of the basics of FPSO production structure and of Bottom Founded Structures.

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -
Conditions for Examination:

Course Evaluation:

*For all subtasks, a minimum grade of 5.0 (no round-off) is required, however the final course grade should be at least 5.5 (after round-off)

Course Necessities:

Basic Microsoft Office (For calculations, Excel or Matlab can be used)

Textbooks and/or Reference Books:

Sukumar Laik, Offshore Petroleum Drilling and Production

S. Chakrabarti, Handbook of Offshore Engineering

General Course Information

GENERAL		
Name of the Study Program:	BSc. Geowetenschappen (BSc. Gw) MSc. Petroleum Geoscience & Engineering (MSc. PGsE) MSc. Mineral Geosciences (MSc. MGs)	
Course Code:	GW1000	
Course Name:	BASIN ANALYSIS	
Study Load [ECTS]:	3.5	
Assumed Knowledge, Prerequisites or Co-requisites:	Pre-requisites for MSc admission, Sedimentology and Sedimentary processes (GW703), Structural geology and Tectonics (GW702), and Petroleum Geology Of The Caribbean Region (GW905)	
Relationship to other courses within the program:	The course allows students to see how the thematic elements of the program come together in explaining the evolution of basin formation in various settings around the world with a focus on the Suriname Basin. It therefore integrates and makes use of earlier course modules, such as GW702, 703, 800 and 801. The GW1000 course (Basin analysis) will concentrate on the background processes driving basin development, this course will provide a practical guide to the sedimentary and tectonic evolution of sedimentary basins.	
STAFF		
Lecturer:	Contact details	
Counterpart Lecturer:	Contact details	
ESTIMATED STUDY LOAD		
¹ Lecture & Classroom Practical [hrs]:	48 (12x4)	NOTES: <ul style="list-style-type: none"> • N/A if not applicable to the course • Totals should match ECTS load equivalent • Practical includes contact hours and hours required by student to solve practical. • 1: Contact Hours
² Literature Study-01 [hrs]:	22 [12+10]	
² Take Home Practical- Hand In Exercises/ [hrs]:	10	
¹ Short Oral Presentation/ Feedback [hrs]:	2	
² Examination- Preparation/ Literature Study-02 [hrs]:	14	

¹ Examination- Oral [hrs]:	2	• 2: Self Study Hours
¹ Examination- Written [hrs]:	0	
Total Hours (ECTS x 28hrs):	98	

*For more information on study load calculation please refer to <https://msingermany.co.in/european-credit-system-ects/>

Course Description:

This course will familiarize students with the major mechanisms involved in formation, subsidence, and filling of sedimentary basins. We will examine the details of basin evolution in tectonically active settings, including convergent, divergent, and strike-slip plate margins and interiors. The material will focus on major structural, tectonic, and geophysical processes that produce sedimentary basins, and develop some skills in basin analysis that allow us to interpret those processes from the stratigraphic record. The application of basin analysis to petroleum exploration will be introduced. When applicable, all of these aspects of Basin Analysis will be correlated with the geologic framework of the Guyana/Suriname Basin.

Learning Outcomes:

- Understand the major mechanisms involved in subsidence and filling of sedimentary basins.
- Become familiar with several important examples of sedimentary basins (volcanic and non-volcanic) worldwide.
- A solid understanding of basin filling models that govern stratigraphic architecture of most basins.
- Acquire detailed insight into tectonic controls on the Guyana-Suriname Basin, through an analysis of global analogs
- Improve and hone public presentation skills via question & answer sessions and classroom presentation at the end of term.

Teaching Method:

Lectures presented in the duration of this course will provide the background information on the interpretation of basin formation from the Guyana/Suriname Basin and basins from around the world. The practical hours of this course will consist of preparation of student oral presentations, short assignments (i.e. - essays and isostatic modeling) and questions and answers.

Course Contents:

Lecture Content

1. Plate Tectonics and Basin Classification
 - Plate Tectonics Overview
 - What is a Basin?
 - Mechanics of Basin Formation

- Sequence Stratigraphy in a new basin
 - Stratigraphic Cycles (Suriname specific)
 - Definitions and recognition
 - Depositional Systems
 - Depositional Style according to basin setting

- 2. Application to Petroleum Systems
 - Onshore migration/trapping Suriname (with permission)
 - Basin Modeling (Suriname) overview (with permissions)

- 3. Practical:
 - Literature Study: Review of lectures and selected publications (as provided during class)
 - Hand in short assignments: Several mainly short in-class exercises will be carried following the lectures. These will be based on the topics lectured. Submission of these assignments will be due the **Saturday** of the week they were assigned.
 - Oral presentations: Mid-term and Final (Comprehensive)

Conditions for Examination:

Course Evaluation:

*For all subtasks, a minimum grade of 5.0 (no round-off) is required, however the final course grade should be at least 5.5 (after round-off)

Course Necessities:

Basic Microsoft Office, email, MS Teams, Zoom

Textbooks and/or Reference Books:

- Allen, P. A. and J.R. Allen, 2013, Basin Analysis: Principles and Application to Petroleum PlayAssessment. John Wile & Sons, 619 pp.
- Reprints of scientific papers related to the course content handed out during the lectures.

GW1001 PRODUCTION OPTIMIZATION

General Course Information

Name: Ir. W. Botermans	Email:	
Counterpart Lecturer:	Contact details	
ESTIMATED STUDY LOAD		
¹ Lecture & Classroom Practical [hrs]:	6 x 2 = 12	NOTES: <ul style="list-style-type: none"> • N/A if not applicable to the course • Totals should match ECTS load equivalent • Practical includes contact hours and hours required by student to solve practical. • 1: Contact Hours • 2: Self Study Hours
² Literature Study-01 [hrs]:	20	
² Project 1:	40	
² Project 2:	40	
¹ Practical- Presentation/ Feedback [hrs]:	N/A	
² Examination- Preparation/ Literature Study-02 [hrs]:	40	
¹ Examination- Oral [hrs]:	N/A	
¹ Examination- Written [hrs]:	3	
Total Hours (ECTS x 28hrs):	154	

*For more information on study load calculation please refer to <https://msingermany.co.in/european-credit-system-ects/>

The actual split of the hours can vary per student based on their efforts, learning efficiency and planning efficiency.

Course Description:

This course describes the work of the oil and gas producing company. It starts after the wells have been drilled and are taken into production. We will follow the process of Monitoring, Identification, Solution selection, Implementation and Data Management. The course will first start with the monitoring plan of the entire production system, although the focus is on inflow and outflow monitoring, surface facilities performance observations are important too. Second, the course will talk about opportunity or problem identification. When the monitoring is carried out correctly, possibilities for further recovery and production improvement can be identified. Once understood, these opportunities can be matured or problems can be solved by selecting the right technologies or production best practices as a third step. The fourth step is to make sure that the solutions are implemented in the field as designed and that the

results are reported in a data management system. This step of post job reporting and data storage will close the loop of production optimization and form the new start of monitoring against new performance parameters.

Learning Outcomes:

After the course the student is able to identify opportunities and/or problems for production and recovery optimization of oil and gas reservoirs.

- Identify under-performing well
- Identify the problem
- Select the solution
- Describe the operational tools and process

Teaching Method:

The course material will be presented via online meetings of 2 hrs. Slides with information and sketches will be presented. The style is active participation.

Exercises will be done to apply the theory. The students will also carry out a project in which a well will be analyzed and proposals for improvement of the production will have to be presented.

Course Contents:

- II. Lecture Content [Summary of lecture subjects]
 - Monitoring reservoir and well performance
 - Water Production
 - Well testing design and implementation
 - Cased hole logging
 - Opportunity and problem identification
 - Formation Damage
 - Acidizing (basics)
 - Hydraulic fracturing (basics)
 - Solution selection & implementation
 - Well service
 - Data management

- III. Practical
 - a. Literature Study
 - b. Hands on exercises between classes
 - i. During course exercises will be made. A summary of the results will have to be made and shown to the instructor. This can be in free format, as long as it is readable and possible to store electronically. Example; Word, Power Point, Excel, scan of written results, picture of written results.
 - c. Project 1
 - i. A report will have to be prepared in Microsoft Word.
 - d. Project 2
 - i. A presentation will have to be given in Microsoft Power Point

Conditions for Examination:

Course Evaluation:

*For all subtasks, a minimum grade of 5.0 (no round-off) is required, however the final course grade should be at least 5.5 (after round-off)

Course Necessities:

Standard Computer with basic MS Office with MS Teams installed

Textbooks and/or Reference Books:

There are various good petroleum engineering text books. These are the preferred ones:

- Fundamentals of Reservoir Engineering – L.P. Dake
- Petroleum Production Systems

If required, references and study material will be provided during the course

Course Schedule (Modular):

GW1003 PETROLEUM ECONOMICS & MANAGEMENT

General Course Information

GENERAL		
Name of the Study Program:	<input type="checkbox"/> BSc. Geowetenschappen (BSc. Gw) <input checked="" type="checkbox"/> MSc. Petroleum Geoscience & Engineering (MSc. PGsE) <input type="checkbox"/> MSc. Mineral Geosciences (MSc. MGs)	
Course Code:	GW1003	
Course Name:	PETROLEUM ECONOMICS & MANAGEMENT	
Study Load [ECTS]:	5	
Assumed Knowledge, Prerequisites or Co-requisites:	<ul style="list-style-type: none"> • BSc Petroleum Engineering, fundamentals of exploration geology, reservoir engineering, reservoir geology, petrophysics, production technology, drilling engineering, facility & offshore engineering • Mathematics and statistics at BSc level • Skills in using XL spreadsheets • Basic understanding of complex systems subject to uncertainty 	
Relationship to other courses within the program:	<ul style="list-style-type: none"> • Economics and decision making are “integrating languages”. All technical disciplines come together in supporting decisions that add value to a company’s or the government’s bottom line. 	
STAFF		
Lecturer:	Contact details:	
Counterpart Lecturer:	Contact details	
ESTIMATED STUDY LOAD		
¹ Lecture & Classroom Practical [hrs]:	36	NOTES: <ul style="list-style-type: none"> • N/A if not applicable to the course • Totals should match ECTS load equivalent • Practical includes contact hours and hours required by student to solve practical. • 1: Contact Hours • 2: Self Study Hours
² Literature Study [hrs]:	24	
² Take Home Practical- Model Exercise [hrs]:	30	
¹ Practical- Presentation/ Feedback [hrs]:	8	
² Examination- Preparation [hrs]:	40	
¹ Examination- Oral [hrs]:	2	
¹ Examination- Written [hrs]:	N/A	

Total Hours (SECTS x 28hrs):	140	
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*For more information on study load calculation please refer to <https://msingermany.co.in/european-credit-system-ects/>

Course Description:

The course will start by introducing some basic concepts in micro-economics and in (investment) decision-making under uncertainty. Topics include exploration economics, project economics, asset life-cycle economics, portfolio economics, corporate economics. Sub-topics include discounted cashflow (DCF) analysis, Capital Asset Pricing Model (CAPM) and Weighted Average Cost of Capital (WACC), time-value of money, corporate finance, hydrocarbon asset technical-to-business integrated modelling (Integrated Asset Modelling – IAM using XL), Monte Carlo uncertainty analysis, decision tree analysis (DTA), sensitivity analysis, risk analysis, options theory, Key Performance Indicators (KPI), (hierarchical) optimization under uncertainty.

All topics are related to the corporate or government’s process of decision-making under uncertainty, given the applicable constraints. The purpose of well-articulated objective functions will be explained and may include short-term, medium-term, long-term objectives and constraints, and pertain to the operational level, project level, asset life-cycle level, portfolio level, corporate level, and/or national level.

Integrated Asset Models (IAM) follow the decision analysis (DA) process, and include concepts such as scenario development and modelling, uncertainty quantification of KPIs and time-series, risk definition, risk analysis, risk tolerance, multi-criteria decision-making, robustness of a decision.

Special attention will be given to the various forms of Government Take (concession regime, tax regime, production sharing contracts – PSC). Also, non-quantitative aspects such as bias, psychology, group think, black swans, etc. will be reviewed. Finally, questions such as “what is a good decision?” and “what is a good forecast?” will also be addressed.

Learning Outcomes:

The main goal of this course is to understand the concepts underlying the (investment) decision-making process, and their relationship to the Government’s decision -making / policy-making process, applicable to the petroleum E&P industry. At the end of this course students should be able to:

- Apply methods to compute an investment’s Key Performance Indicators, which act as decision criteria.
- Do this including model input parameter uncertainty (technical, economic, planning uncertainties).
- Understand how to relate the different hierarchical decision levels (operational, project, asset, portfolio, corporate): optimizing value at one level is not necessarily optimal at the next higher level.
- Understand and articulate concepts such as (added) value, risk and opportunity.
- Understand the fundamental relationship between risk and minimum required expected return.
- Understand the quantitative and non-quantitative aspects in Decision Analysis.
- Understand the (economic) relationship between an (international) oil company and the Government.

Teaching Method:

Teaching methods will consist of:

- Lectures
- Practical exercises using XL
- Class discussions and exercises
- Student presentations on economic topics, including reactions / questions by students in audience
- Self-study using the course syllabus, power-point presentations, literature
- On-line Q&A
- An oral closed-book exam

Course Contents:

e. Lecture Content:

- i. Introduction to Petroleum Economics
- ii. Cash flow analysis, Time Value of Money and Project Evaluation
- iii. Contract and legislation
- iv. Sensitivity analyses
- v. Crude Pricing and Revenue Management
- vi. Sustainable Economics in the Petroleum Industry

f. Practical:

- i. Analysis of current market data on oil and gas prices
- ii. Case study of fiscal systems in different countries
- iii. The importance of Unit Technical Cost
- iv. How do companies reconcile profitability with sustainability?
- v. Setting up various economic project cashflow models using XL
- vi. Computing KPIs, including short-term vs long-term KPIs

Conditions for Examination:

Course Evaluation:

*For all subtasks, a minimum grade of 5.0 (no round-off) is required, however the final course grade should be at least 5.5 (after round-off)

Course Necessities

- MS Teams
- MS Word / PowerPoint / Excel

Textbooks and/or Reference Books:

Hand Out (course syllabus): Petroleum Economics and Management course (Code GW1003), MSc.

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

Petroleum Geoscience & Engineering (MSc. PGsE), Anton de Kom University Suriname, April/May 2025

GW1002 Marine Pipelines and Subsea Engineering

General Course Information

GENERAL		
Name of the Study Program:	<input type="checkbox"/> BSc. Geowetenschappen (BSc. Gw) <input checked="" type="checkbox"/> MSc. Petroleum Geoscience & Engineering (MSc. PGsE) <input type="checkbox"/> MSc. Mineral Geosciences (MSc. MGs)	
Course Code:	GW1002	
Course Name:	Marine Pipelines and Subsea Engineering	
Study Load [ECTS]:	5.5	
Assumed Knowledge, Prerequisites or Co-requisites:	It is assumed that students have successfully completed the foundational courses covering geology, reservoir engineering and preceding offshore engineering courses.	
Relationship to other courses within the program:	The course builds on the general knowledge gained in the preceding offshore engineering courses on structures and facilities required for the development of offshore oil and gas fields.	
STAFF		
Lecturer:	Contact details:	
Counterpart Lecturer:	Contact details	
ESTIMATED STUDY LOAD		
¹ Lecture & Classroom Practical [hrs]:	60 (3 classes per week of each 4 hours for 5 weeks)	NOTES: <ul style="list-style-type: none"> • N/A if not applicable to the course • Totals should match ECTS load equivalent • Practical includes contact hours and hours required by student to solve practical. • 1: Contact Hours • 2: Self Study Hours
² Literature Study [hrs]:	30	
² Take Home Practical- Hand In Exercises [hrs]:	31	
² Examination- Preparation [hrs]:	30	
¹ Examination- Written [hrs]:	3	
Total Hours (ECTS x 28hrs):	154	

*For more information on study load calculation please refer to <https://msingermany.co.in/european-credit-system-ects/>

Course Description:

This course will provide students with an understanding of the required processes in place to install subsea pipelines and structures as part of oil and gas field developments.

Learning Outcomes:

Upon successful completion of this course students will be able to:

- work in a multi-disciplinary project team and provide input regarding pipeline and subsea installations requirements;
- prepare concept design of pipeline and subsea installations for an oil and gas field development;
- liaise at professional level with offshore structures design consultants and contractors, with specific focus on design, fabrication, installation and operation of pipelines and subsea installations.
- assist field asset managers in decision making process concerning offshore oil and gas developments.

Teaching Method:

- Academic and industry expert lectures presented. A structured and thematic program is followed for knowledge transfer and cultivation of understanding. Students are stimulated to further explore and research the subjects taught.
- Interactive offshore engineering assignments with direct feedback from staff are integrated in the program. This reinforces the topics learned from lectures.
- Small group exercises with hands-on presentation and participation in discussion of results empower student learning.

Course Contents:

g. Contents:

- Typical layouts of an offshore (green) field development
- Factors that determine the type of field layout
- Typical assets that are part of a SURF infrastructure – Assignment 1
- Flow lines:
 - Types of Pipelines – Assignment 2
 - Flow assurance – Assignment 3
 - Design of Pipelines – Assignment 4
 - Pipeline installation methods: S-lay, Reel Lay and J-Lay – Assignment 5
 - Pipeline support (including buckling) and burial – Assignment 6
 - Pre-commissioning – Assignment 7a
 - Corrosion and Maintenance – Assignment 7b
- Subsea systems:
 - Type of subsea systems and their functions – Assignment 8
 - Installation methods of subsea systems – Assignment 9
- Typical CAPEX and OPEX – Assignment 10
- Diving operations – Assignment 11
- Remotely Operated Vehicles (ROV) – Assignment 12

- h. **Assignments:** Students will be asked to provide input for the development of the SURF infrastructure of an ongoing field development in deep and or shallow water. Emphasis will lie on knowing which basic components are required, the basic design philosophies

of each component, basic installation principles and the external factors that need to be considered in order to make the right technical decisions for SURF infrastructure development.

Conditions for Examination:

Course Evaluation:

*For all subtasks, a minimum grade of 5.0 (no round-off) is required, however the final course grade should be at least 5.5 (after round-off)

The minimum passing score required to pass the complete course is 5.0, however the final grade should be 5.5 at minimum.

Course Necessities:

Basic Microsoft Office, MS Teams

Textbooks and/or Reference Books:

S. Laik, Offshore Petroleum Drilling and Production, CRC Press, 2018

A. Palmer and R. King, Subsea Pipeline Engineering 2nd Edition, 2008

L. Maria de Araujo Lima Gaudencio, R. de Oliveira, W. Curi, Construction of Sustainability Indicators System for Offshore Oil and Gas Production Units, 2021

B. Gerwick Jr., Construction of Marine and Offshore Structures 3rd Edition, 2007

S. Chandrasekaran, Dynamic Analysis and Design of Offshore Structures 2nd Edition, 2015

A. Bahadori, Oil and Gas Pipelines and Piping Systems Design, Construction, Management, and Inspection, 2017

Y. Bai and Q. Bai, Subsea Engineering Handbook, 2010

GW1004 The Global Energy Transition

General Course Information

GENERAL		
Name of the Study Program:	<input type="checkbox"/> BSc. Geowetenschappen (BSc. Gw) <input checked="" type="checkbox"/> MSc. Petroleum Geoscience & Engineering (MSc. PGsE) <input type="checkbox"/> MSc. Mineral Geosciences (MSc. MGs)	
Course Code:	GW1004	
Course Name:	The Global Energy Transition	
Study Load [ECTS]:	4	
Assumed Knowledge, Prerequisites or Co-requisites:	Knowledge of exploration and production of georesources and subsurface activities. Interest in the current transition from fossil fuels to more sustainable energy is a prerequisite. Basic knowledge of the interlinkages and drivers of the international energy markets at the political, policy and corporate level.	
Relationship to other courses within the program:	This course integrates the disciplinary insights from Earth Sciences, Economics, Environmental Policy and Governance to arrive at interdisciplinary solutions to the complex sustainability problems of tomorrow.	
STAFF		
Lecturer:	Contact details:	
Counterpart Lecturer:	Contact details:	
ESTIMATED STUDY LOAD		
¹ Lecture & Classroom Practical [hrs]:	30	NOTES: <ul style="list-style-type: none"> • N/A if not applicable to the course • Totals should match ECTS load equivalent • Practical includes contact hours and hours required by student to solve practical. • 1: Contact Hours • 2: Team work
² Literature Study-01 [hrs]:	0	
² Take Home Practical- Hand In Exercises/ Paper/ Essay/Report [hrs]:	0	
¹ Practical- Presentation/ Feedback [hrs]:	29	
² Preparation/ Literature Study/paper[hrs]:	53	
¹ Examination- Oral [hrs]:	0	
¹ Examination- Written [hrs]:	0	
Total Hours (ECTS x 28hrs):	112	

*For more information on study load calculation please refer to <https://msingermany.co.in/european-credit-system-ects/>

Course Description:

Subjects covered include

- The tension field between energy policy objectives of secure energy supplies, a clean environment and an affordable energy price;
- The dominance of fossil fuels in the primary energy mix and changing patterns of energy consumption in OECD-countries, Russia and China;
- The overall oil- and gas balance and its relationship with the large consuming regions in a geopolitical context;

Students in this course will

- Be offered a framework to analyse energy policy
- Gain insight in how countries deal with the tension between the policy objectives of secure energy supplies, a clean environment and affordable energy prices
- Learn about today's geopolitics of and between consuming and producing states
- Develop a greater awareness of how several institutions influence low-carbon policies
- Examine the possible impacts of technological developments on geopolitics

Learning Outcomes:

After completing this course, students will be able to:

- Understand the main concepts and theories in energy transition and be able to put them in a wider context of global sustainable development
- Be offered a framework to analyse energy policy;
- Learn about the impact of climate policies, consequences for fossil fuels and subsidies;
- Learn about trends and developments in global energy demand and supply;
- Learn about the competition between major consuming countries and between major consuming and producing countries;
- Be offered a historical view on energy geopolitics of the past 25 years;
- Learn about today's geopolitics of and between consuming and producing countries;
- Learn about possible and plausible energy futures;
- Discuss the geopolitical and economic dimensions of energy security throughout the course.

Teaching Method:

- The course will be given in a blended form, i.e. partly face-to-face (e.g. interactive lecturing, workshops) and partly online (e.g. web lectures, online documents)
- Self-study
- Write a policy document
- Participate in debates/workshops
- Group research project

Course Contents:

Subjects covered include

- The long-term geopolitical and geo-economic aspects of energy transition
- Different scenarios on the future global energy mix including the role of renewables

COURSE DESCRIPTION - DEPARTMENT OF GEOSCIENCES -

- Trends and developments in the oil and gas market
- Technological and institutional changes affecting energy transition
- The challenges facing policy-makers in consuming and producing countries in transition

*Lectures/Workshops will cover:

- The global energy transition landscapes
- The gas markets and gas industry overview
- The EU energy policy story
- Groningen gas: the loss of a social license to operate (*Workshop*)
- The world of the energy scenario's; the geopolitics of (renewable) energy (*Workshop*)
- Oil markets and oil industry overview
- Challenges for the international oil industry
- The discovery of a major hydrocarbon occurrence in the Guiana Basin, offshore Suriname: a blessing or a curse? (*Workshop*)

Conditions for Examination:

Course Evaluation:

*For all subtasks, a minimum grade of 5.0 (no round-off) is required, however the final course grade should be at least 5.5 (after round-off)

Textbooks and/or Reference Books:

https://en.wikipedia.org/wiki/The_Prize:_The_Epic_Quest_for_Oil,_Money,_and_Power

<https://www.iea.org/reports/world-energy-outlook-2021>

<https://www.chathamhouse.org/publication/transparency-in-transition-eiti-bradley>

<https://www.chathamhouse.org/publication/carbon-risk-resilience-how-energy-transition-changing-prospects-countries-fossil>

<https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2021-full-report.pdf>

<https://www.eia.gov/todayinenergy/>

<http://www.adekusjournal.com/ojs/index.php/acjournsu/article/view/6>

<https://www.sciencedirect.com/science/article/pii/S2211467X19300677?via%3Dihub>

<https://www.irena.org/publications/2019/Jan/A-New-World-The-Geopolitics-of-the-Energy-Transformation>

<https://hcss.nl/report/groningen-gas-loss-social-license-operate>

<https://hcss.nl/report/gas-supply-security-in-the-netherlands-geopolitical-and-environmental-dilemmas/>

<https://hcss.nl/report/european-tank-storage-sector/>

<https://hcss.nl/report/securing-critical-materials-for-critical-sectors-policy-options-for-the-netherlands-and-the-european-union/>

<https://hcss.nl/news/new-report-deteriorating-outlook-dutch-small-natural-gas-fields>

<https://hcss.nl/report/russias-unsustainable-business-model/>

<https://hcss.nl/expert/lucia-van-geuns>

GW1101: FIELD DEVELOPMENT PROJECT

General Course Information

GENERAL	
Name of the Study Program:	<input type="checkbox"/> BSc. Geowetenschappen (BSc. Gw) <input checked="" type="checkbox"/> MSc. Petroleum Geoscience & Engineering (MSc. PGsE) <input type="checkbox"/> MSc. Mineral Geosciences (MSc. MGs)
Course Code:	GW1101
Course Name:	FIELD DEVELOPMENT PROJECT
Study Load [ECTS]:	7
Assumed Knowledge, Prerequisites or Co-requisites:	All preceding courses of the MSc. Program.
Relationship to other courses within the program:	This course integrates all knowledge from previous courses with the main objective to generate an optimal field development plan for a hydrocarbon field.
STAFF	
Lecturer & Counterpart:	Contact details:
Geology & Geophysics: Petrophysics: Production Geology: Reservoir Engineering: Offshore Engineering: Economics, HSE & PSC:	

Course Description:

On the basis of provided subsurface and surface data students need to formulate a field development plan for this course. Specific knowledge acquired in earlier courses (geophysics, petrophysics, production geology, reservoir engineering, offshore engineering and economics) will be needed to set up and execute a development plan using seismic, petrophysical and reservoir data. The development plan will be documented and presented to the lecturers & counterparts.

Learning Outcomes:

General learnings:

At the end of this course students will have demonstrated that they are able to:

- Apply acquired knowledge of the MSc course on defining and documenting a field development study (FDP)
- Explain the interaction between the specialist disciplines in Geology-Reservoir and Offshore Engineering
- Be able to quantify the implications of subsurface activities and deal with inaccuracy and uncertainty.
- Integrate contributions from different disciplines as a team.
- Integrate specific knowledge from geophysics, petrophysics, geology, reservoir engineering, production technology and offshore engineering for setting up a field development plan using seismic, petrophysical and reservoir data
- Evaluate the economic merits of the proposed FDPs
- Evaluate the societal impact and risks of the FDPs
- Present a field development plan to a management panel.

Learnings per discipline:

G&G:

- Setting up of an interpretation project
- Definition of project coordinate system
- Checking of internal consistency, data QC
- Interpretation of seismic and well data
- Generation of maps (structure, attribute, thickness)
- Literature study on the reservoir environment of deposition
- Build a geological model

Petrophysics:

- Multi-well formation evaluation to calculate all the reservoir properties required to perform a volumetric evaluation. Properties calculated include:
 - Clay content
 - Porosity and

- Water saturation
- Permeability

Production Geologist:

- Two main learnings:
 - 1) How to build a static model
 - 2) how to determine volumes
- Sub task learnings:
 - To gather, QC and analyze critical input data at building of a static model
 - Build a 3D pillar grid from faults derived from seismic interpretation
 - Create a stratigraphic subdivision that is optimal for volumetrics and fluid flow
 - Build and QC a 3D geocellular reservoir model
 - Populate the reservoir model with properties in such a way that it honors both reservoir simulation purposes and geology
 - Volumetric calculations

Reservoir Engineering:

- To gather, QC and analyze critical input data at building of a dynamic model
- To understand the uncertainty quantification by varying the relevant parameters
- To master production forecasts and scenario testing by forward reservoir simulations

Offshore Engineering:

- To understand the different concepts of oil and gas offshore platforms
- To understand the different options in subsea engineering
- To understand the effect of existing infrastructure and the environment on the choice of offshore production systems
- To evaluate the offshore processing options based on reservoir fluids, export options, existing infrastructure

Economics, HSE & PSC:

- Setting of an economic model, incorporating local fiscal terms (Surinamese), production profiles, cost estimates and phasing.
- Additional activities required to arrive at an FDP proposal (appraisal drilling, testing)
- Calculation of economic parameters: NPV or EMV
- Assessment of HSE Suriname procedures: ESIA and Oil spill response

Teaching Method:

The students (groups of 5 students) will be given a data set to perform analysis to define a field development plan. Acquired knowledge, course contents and literature of previous courses need to be

used for this course. For each discipline, an introduction will be given on the tasks, deliverables, and instructions by the Lecturers. During working on the practical, the lecturers and counterparts will be available for guidance. After each discipline, the deliverables will be presented to the lecturers and counterparts. When the practical work is finalized, the students will present the results and hand in an executive summary.

Course Contents:

Tasks and Deliverables:

- G&G:
 - Tasks:
 - Gathering of data, seismic, well data (log data, T/Z data , deviation data) cultural data (from NLog data base), acquisition/processing reports
 - Verification of project coordinate system, checking of internal consistency, definition of units system
 - Loading of all data into a project data base.
 - Re-checking internal consistency
 - Report on data loading, mention any anomalies, polarity/phase of seismic
 - Interpretation of seismic data, incorporation of well data, well to seismic ties
 - Literature study on reservoir environment of deposition
 - Two Way Time model
 - Depth conversion
 - Deliverables:
 - Depth converted structure, thickness, attribute maps
 - Fault interpretation
 - Depositional model/concept
- Petrophysics:
 - Tasks:
 - Calculation of clay content (GR methods only), porosity, permeability and water saturation. Since this is a multi-well study and students are working under time constraints, it is suggested that (X) groups are formed with each group interpreting one/two wells.
 - Several group sessions will be held with (1) group discussing:
 - Use the best/optimal method to calculate the desired properties
 - Agree on the type and values of the required input parameters (water salinity, matrix density, clay parameters etc.
 - Establish guidelines to estimate petrophysical uncertainties and related uncertainty ranges
 - Deliverables:
 - For each well a set of continuous curves of VClay, porosity, permeability and water saturation over the indicated reservoir zones.

- A preliminary assessment of cutoff criteria for Net/Gross, porosity and water saturation to determine the Net Reservoir and net pay intervals.
- Production Geology:
 - Tasks:
 - Gather, QC and analyze critical input data at building of a static model: well logs (raw and evaluation), depth and isochore maps, RFT, production logs, well test permeabilities and flow boundaries
 - Build a 3D pillar grid from faults derived from seismic interpretation
 - Create a stratigraphic subdivision that is optimal for fluid flow and volumetrics
 - Build and QC a 3D geocellular reservoir model
 - Populate the reservoir model with properties in such a way that it honours both reservoir simulation purposes and geology
 - Calculate volumes in place
 - Deliverables:
 - Petrel static model
 - ECLIPSE/CMG export grid
 - Volumetrics

Reservoir Engineering:

- Tasks:
 - Collect, QC and QA the following input data required for building the dynamic model: PVT and SCAL
 - Validate the permeabilities in the model with DST data
 - Set-up, initialize and validate a dynamic reservoir model based on the static model developed in the previous sessions and PVT, RCA and SCAL data
 - Quantify the uncertainties for several key parameters by running reservoir simulations by running various scenarios, where parameters are varied one by one
 - Run development concepts on a base case reservoir model and determine optimum development scenario's including a production forecast (EUR)
- Deliverables:
 - PVT and SCAL data in table and graphical form to be used as input
 - Reservoir dynamic model with quantified uncertainties
 - Development scenarios with production forecast (number of wells, production strategy etc..)

Offshore Engineering:

- Tasks:
 - Evaluate the provided field from an offshore production systems point of view and choose an offshore structure for production.
 - Evaluate field and environmental properties to combine with the previous task and provide a concept for the subsea equipment.

* First task includes export options, drilling options etc. Second task includes a field layout based on the number of wells (and possibly gas/water re-injection etc.)

- o Deliverables:
 - An offshore structure and a field layout for all subsea equipment

Economics, HSE & PSC:

- o Tasks:
 - Economics
 - Setting of an economic model, incorporating local fiscal terms (Surinamese), production profiles, cost estimates and phasing.
 - Oil and gas price predictions
 - Additional activities required to arrive at an FDP proposal (appraisal drilling, testing)
 - Calculation of economic parameters, NPV or EMV
 - Sensitivity analysis
 - HSE:
 - Perform an HSE Assessment
 - ESIA planning
- o Deliverables:
 - Net Present value of the project and proposals for further activity.
 - HSE plan

Conditions for Examination:

One Pager executive summary should be handed in on the day of the final presentation.

Course Evaluation:

*For all subtasks, a minimum grade of 5.0 (no round-off) is required, however the final course grade should be at least 5.5 (after round-off)

Course Necessities:

- Basic Microsoft office
- Matlab
- Petrel
- CMG (if Petrel RE is unavailable)

Textbooks and/or Reference Books:

All references of the previous courses can be used.

GW906 FIELD ENGINEERING TRIP

General Course Information

GENERAL		
Name of the Study Program:	<input type="checkbox"/> BSc. Geowetenschappen (BSc. Gw) <input checked="" type="checkbox"/> MSc. Petroleum Geoscience & Engineering (MSc. PGsE) <input type="checkbox"/> MSc. Mineral Geosciences (MSc. MGs)	
Course Code:	GW906	
Course Name:	FIELD ENGINEERING TRIP	
Study Load [ECT]:	3.5	
Assumed Knowledge, Prerequisites or Co-requisites:	Basic knowledge of key theoretical fundamental principles and methods in exploring, producing, transporting and processing of hydrocarbons into an end market product.	
Relationship to other courses within the program:	The field trip Engineering to Trinidad and Tobago is an integrated trip containing a combination of Geological, Petrophysical and Reservoir Engineering (Petroleum fluid flow) subjects.	
STAFF		
Trip Leaders:	Contact details:	
Members of AAPG Young Professionals Trinidad and Tobago	Email: tt.ychapter@gmail.com Phone: +1 (868) 348-8035 Online Platform Contact/ Preference: Onsite Residential City: Trinidad	
Counterpart Lecturer:	Contact details:	
ESTIMATED STUDY LOAD		
Preparation and Executing [hrs]:	90	NOTES: Physical trip to Trinidad
Literature Study [hrs]:	3	
Take Home Practical [hrs]:	5	
Practical- Oral Examination [hrs]:	NA	
2Examination- Preparation [hrs]:	NA	
Examination- Written [hrs]:	NA	
Total Hours (ECT x 28hrs):	98	

*For more information on study load calculation please refer to <https://msingermany.co.in/european-credit-system-ECT/>

Course Description:

This course is an in-person field trip of approximately 8 days to Trinidad and Tobago. This physical field trip course will highlight the main characteristics of basin development, exploring hydrocarbons, exploitation and delivering oil and gas end products. The recent tectonic activity in the Trinidad and Tobago area resulted in an uplift of the sedimentary structures, these structures are clearly visible on land and across the coast of Trinidad and Tobago. Trinidad and its surrounding sea lie at the eastern end of the Caribbean plate – South American plate zone of wrench compression and have seen the most recent tectonic activity. The field trip consists of a part, focused on the detailed understanding of the sedimentary structures present in the multiple sedimentary basins, ranges and thrust systems of Trinidad. The second part of the trip is focused on the development, transporting and processing of hydrocarbons into end products. Visit to the Point Lisas Industrial Estate, hydrocarbon fields and the National Energy Corporation of Trinidad and Tobago is also part of this course.

Learning Outcomes:

Multiple learning outcomes are described below depending on the topic of the day.

- Introducing participants to some of the standard methodologies used in exploring an area for hydrocarbons, it will entail identification of minerals, rock types and understanding their role in petroleum exploration.
- Getting familiar to the sedimentary highlights explored within the Southern Basin geology of Trinidad and Tobago.
- Introduction to the several end products which are produced at The Point Lisas Industrial Estate; the primary location where multiple companies deliver their hydrocarbons for further processing or to be used as energy source for the industry plants.
- Introduce to additional companies who contribute to the oil and gas sector within Trinidad and Tobago in significant ways.
- Enable the participant in comparing the sedimentary structures seen on the various outcrops with interpretation based on seismic and well log data. It should increase the appreciation of adding or integrating practical information such as outcropping data as an analogue in describing a geological concept.
- Students will develop practical skills in conducting basin evaluation using the outcrops and seismic data for the Trinidad and Tobago area.
- The participants will be exposed to multiple outcrops varying from shallow water deltaic to deep water slope channels depositional environment systems. Several of the outcrops are influenced by tectonic activities (faults) in the area.
- The students will observe and understand the cause of the several mud volcanoes and the well-known “Pitch Lake” that is present in the area.
- The participants will be able to experience the water steps in the Northern Range area of Trinidad of Tobago, almost spongy nature of the tufa deposits, which are being aided by reprecipitation of the dissolved Cuare and Aripo limestones, and the Hollis conglomeratic limestones from further upstream.
- Group summary reporting involving short description of each day in the field will provide the participants with opportunities to exercise their technical evaluation abilities, team working and clear, concise and timely reporting skills.

Teaching Method:

The teaching method for this course implies one short lecture presentation about the geology of Trinidad and Tobago. The course mainly consist a physical trip to Trinidad and Tobago visiting the various sedimentary outcrops and the oil and gas industry to demonstrate the theoretical learnings into the practical situation.

Course Contents:

A detailed field guide will be provided in front by the AAPG Young Professionals Trinidad and Tobago.

Conditions for Examination:

The examination of this course implies handing in the practical field trip report by target date containing summary and learnings from the field trip. **For all subtasks, a minimum grade of 5.0 (no round-off) is required, however the final course grade should be at least 5.5 (after round-off)*

Course Necessities:

- MS Teams
- MS Words/ Excel/ PowerPoint

Field trip requirements and Equipment:

- Closed shoes suitable for extended walking, water shoes for beach walks, steel tip boots for wellsite visit. Appropriate clothing for up to 5 hours in the sun with temperatures c. 32 C and >75% humidity. Sun hats and sunscreen. Possibility for rain showers.
- Stay hydrated, water will be provided at all trips.
- Hard hats to be worn when approaching the outcrops - be aware of falling debris and debris on the beach.
- If using a geological hammer, gloves and safety glasses must be worn.
- Everyone is responsible for the trip's safety – please intervene if you see an unsafe act and immediately alert trip leaders.
- Everyone has Stop Work authority. If you see and unsafe situation, ALERT!

Textbooks and/or Reference Books:

- Aslan, A., White, W.A., Warne, A.G., Guevara, E.H., 2003. Holocene evolution of the western Orinoco Delta, Venezuela. Geol. Soc. Am. Bull. V. 115, p. 479-498.
- Bhattacharya, J.P., Giosan, L., 2003. Wave-influenced deltas: geomorphological implications for facies reconstruction. Sedimentology v. 50, p. 187-210.
- Bowmann, A., and Johnson, H. D., 2014, Storm-dominated shelf-edge delta successions in a high accommodation setting: The palaeo-Orinoco Delta (Mayaro Formation), Columbus Basin, south-east Trinidad, Sedimentology, v. 61, no. 3, p. 792-835, doi 10.1111/sed.12080.

- Carvajal, C., and Steel, R. J., 2009, Shelf-edge architecture and bypass of sand to deep water: Influence of shelf-edge processes, sea level, and sediment supply, *Journal of Sedimentary Research*, v. 79, p. 652-672, doi 10.2110/jsr.2009.074.
- Chen, S., Steel, R. J., Dixon, J., and Osman A., 2014, Facies and architecture of a tide-dominated segment of the late Pliocene Orinoco Delta (Morne L'Enfer Formation) SW Trinidad, *Marine and Petroleum Geology*, v. 57, p. 208-232, doi 10.1016/j.marpetgeo.2014.05.014.
- Chen, S., Steel, R. J., and Olariu, C., 2016, Upper-Slope to Shelf-Edge Delta Architecture, Miocene Cruse Formation, Orinoco Shelf, *Journal of Sedimentary Research*, v. 86, p. 87-106, doi 10.2110/jsr.2016.7.
- Chen, S., Steel, R. J., Olariu, C., and Li, S., 2017, Growth of the paleo-Orinoco shelfmargin prism: Process regimes, delta evolution, and sediment budget beyond the shelf edge, *GSA Bulletin*, v. 130, p. 35-63, doi 10.1130/B31553.1.
- Dalrymple, R.W., and Choi, K., 2007, Morphologic and facies trends through the fluvial-marine transition in tide-dominated depositional systems: A schematic framework for environmental and sequence-stratigraphic interpretation: *EarthScience Reviews*, v. 81, p. 135-174.
- Dixon, R.J., 2005, Field trip to examine outcrops of the Mayaro Formation, Mayaro Beach, SE Trinidad. in *Guide to Selected Geological Localities on Trinidad and Tobago*. Geological Society of Trinidad and Tobago. 39p.
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- Gingras, M.K., Rasanen, M.E., Pemberton, S.G., Romero, L.P., 2002. Ichnology and sedimentology reveal depositional characteristics of bay-margin parasequences in the Miocene Amazonian foreland basin. *Journal Sedimentary Research*. v. 72, p. 871-883.
- Huggins, G.V., 2007, The Facies Architecture of the Manzanilla Formation, Trinidad and Tobago, Unpublished MS Thesis, University of Texas at Austin, 81 p.
- Miller, K.G., Kominz, M.A., Browning, J.V., Wright, J.D., Mountain, G.S., Katz, M.E., Sugarman, P.J., Cramer, B.S., Christie-Blick, N., and Pekar, S.F., 2005, The Phanerozoic record of global sea-level change, *Science*, v. 310, p. 1293-1298, doi 10.1126/science.1116412.
- Kolla, V., and Perlmutter, M.A., 1993, Timing of turbidite sedimentation on the Mississippi Fan: *American Association of Petroleum Geologists, Bulletin*, v. 77, p. 1129-1141.
- Kugler, H. G., 2001, *Treatise on the Geology of Trinidad*, H. M. Bolli and M. eds. Knappertsbusch, Natural History Museum of Basel, 309p.
- Peng, Y., Steel, R.J., Rossi, V.M., and Olariu, C., 2018, Mixed-Energy Process Interactions Read from a Compound-Cliniform deltas (Paleo-Orinoco Delta, Trinidad): Preservation of River and Tide Signals by Mud-induced Wave Damping, *Journal of Sedimentary Research*, v. 85, p. 75-90
- Penland, S., Boyd, R., Suter, J.R., 1988. Transgressive depositional systems of the Mississippi delta plain: a model for barrier shoreline and shelf sand development. *J. Sediment. Res.* 58, 932e949.
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