Form: Course Syllabus	Form Number	EXC-01-02-02A
	Issue Number and Date	2/3/24/2022/2963 05/12/2022
	Number and Date of Revision or Modification	
	Deans Council Approval Decision Number	2/3/24/2023
	The Date of the Deans Council Approval Decision	23/01/2023
	Number of Pages	06

1.	Course Title	**Igneous Petrology**
2.	Course Number	0305931
3.	Credit Hours (Theory, Practical)	3, theory
	Contact Hours (Theory, Practical)	3, theory
4.	Prerequisites/ Corequisites	-
5.	Program Title	PH.D in Geology
6.	Program Code	-
7.	School/ Center	School of Science
8.	Department	Geology
9.	Course Level	PH D program
10.	Year of Study and Semester (s)	-
11.	Other Department(s) Involved in Teaching the Course	-
12.	Main Learning Language	English
13.	Learning Types	✔ Face to face learning ☐Blended ☐Fully online
14.	Online Platforms(s)	✔ Moodle ✔ Microsoft Teams
15.	Issuing Date	25/04/2025
16.	Revision Date	

17. Course Coordinator:

Name: Dr Najel Yaseen Contact hours: -

Office number: Geology 202 Phone number: ext: 22275

Email: nyaseen@ju.edu.jo

18. Other Instructors:

Name:
Office number:
Phone number:
Email:
Contact hours:
Name:
Office number:
Phone number:
Email:
Contact hours:

19. Course Description:

Overview of major igneous rocks associations**.** Phase equilibria in igneous rocks. Chemical petrology and modeling of igneous processes using major and trace elements and isotopes. Geothermometry and geobarometry in igneous rocks.

20. Program Student Outcomes (SO's): (To be used in designing the matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program)

(SO1) Students will be able to design and execute original research, employing advanced methodologies to generate new knowledge in their specialized area of geology

(SO2) Students will display the potential to seriously evaluate complex geological problems, the usage of analytical and problem-fixing capabilities to develop modern answers and interpretations of their studies.

(SO3) Students will benefit know-how in using cutting-edge gear, techniques, and technology applicable to their geological research, applying these abilities to research and cope with complicated geological phenomena.

(SO4) Students will effectively communicate their studies findings via academic guides, presentations, and conferences, making significant contributions to the scientific network and attractive technical and non-technical audiences.

(SO5) Students will showcase a sturdy dedication to ethical studies practices and apprehend the broader societal and environmental affects of their work, promoting sustainability and integrity within the subject.

(SO6) Students will demonstrate a determination to persistent mastering, actively enticing with rising studies, and professional improvement possibilities to maintain and amplify their know-how throughout their careers.

PILO's	***National Qualifications Framework Descriptors***		
	Competency (C)	**Skills (B)**	**Knowledge (A)**
1.		X	
2.		X	
3.			X
4.		X	
5.	X		
6.			X

21. Course Intended Learning Outcomes (CLO's): (Upon completion of the course, the student will be able to achieve the following intended learning outcomes)

CLO1 **Differentiate** among major magmatic suites based on their tectonic settings and associated petrological characteristics.

CLO2 **Employ** phase diagrams and phase equilibria modelling software to reconstruct the thermal history of a magmatic suite.

CLO3 **Analyze** the major- and trace-element geochemistry and isotopic systems of igneous rocks and minerals to unravel the petrogenetic evolution of a magmatic association.

CLO4 **Infer** magmatic processes and the thermo-tectonic evolution of a suite by applying mineral thermometry and barometry.

CLO5 **Evaluate** the economic potential of a magmatic suite by examining its petrological characteristics and geochemical signatures.

CLO6 **Construct** a comprehensive petrogenetic model for a given magmatic suite by synthesizing petrological, geochemical, and isotopic data.

Course CLOs	**The learning levels to be achieved**					
	Remembering	**Understanding**	**Applying**	**Analysing**	**evaluating**	**Creating**
CLO (1)	✔	✔				
CLO (2)	✔		✔			
CLO (3)	✔			✔		
CLO (4)	✔	✔	✔			
CLO (5)	✔				✔	
CLO (6)	✔					✔

22. The matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program:

Program SO's / Course CLO's	SO (1)	SO (2)	SO (3)	SO (4)	SO (5)	SO (6)	Descriptors**		
							A	B	C
CLO (1)		✔	✔				X		
CLO (2)	✔		✔					X	
CLO (3)	✔		✔				X	X	
CLO (4)		✔	✔					X	
CLO (5)		✔			✔				X
CLO (6)	✔	✔		✔				X	X

23. Topic Outline and Schedule:

Week	Lecture	Topic	CLO/s Linked to the Topic	Learning Types (Face to Face/ Blended/ Fully Online)	Platform Used	Synchronous / Asynchronous Lecturing	Evaluation Methods	Learning Resources
1		General introduction						
2	2	Introduction to Major Igneous Rock Associations Tectonic Settings of Igneous Rocks	1	Face to Face			Exams + assignments	Suggested readings + papers
3	2	Classification and Nomenclature of Igneous Rocks Overview of Magmatic Suites and Their characteristics	1	Face to Face			Exams + assignments	Suggested readings + papers
4	2	Fundamentals of Phase Equilibria in Igneous Systems Application of Phase Diagrams to Natural Systems	2	Face to Face			Exams + assignments	Suggested readings + papers
5	2	Introduction to Chemical Petrology Major Element Modeling in Igneous Processes	3	Face to Face			Exams + assignments	Suggested readings + papers
6	2	Trace Element Partitioning in Igneous Rocks Modeling Magmatic Processes Using Trace Elements	3	Face to Face			Exams + assignments	Suggested readings + papers
7	2	Isotopic Systems in Igneous Petrology (1) Isotopic Systems in Igneous Petrology (2)	3	Face to Face			Exams + assignments	Suggested readings + papers
8	2	Applications of Isotopes in Petrogenetic Studies **Midterm Exam**		Face to Face			Exams + assignments	Suggested readings + papers

		(2 hours)						
9	2	Geothermometry in Igneous Rocks (1) Geothermometry in Igneous Rocks (2)	4	Face to Face				
10	2	Geobarometry in Igneous Rocks (1) Geobarometry in Igneous Rocks (2)	4	Face to Face			Exams + assignments	Suggested readings + papers
11	2	Economic Geology and Magmatic Associations (1) Economic Geology and Magmatic Associations (2)	5	Face to Face			Exams + assignments	Suggested readings + papers
12	2	Ore Deposits Related to Igneous Processes	5	Face to Face			Exams + assignments	Suggested readings + papers
13	2	Integrative Petrogenetic Modeling with MELTS and Other Software	6	Face to Face			Exams + assignments	Suggested readings + papers
14	2	Presentations **Final EXAM**		Face to Face			Exams + assignments	Suggested readings + papers

24. Evaluation Methods:

Opportunities to demonstrate achievement of the CLOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topic(s)	CLO/s Linked to the Evaluation activity	Period (Week)	Platform
Midterm Exam	30	TBD	1,2,3	End of eighth week	
Home Assignments	10	TBD	1,2,3,4,5,6	Weekly	
Project and presentation	20	TBD	1,2,3,4,5,6	Term-long project due at the end of the semester	
Final Exam	40	TBD	3,4,5,6	End of semester	

25. Course Requirements:

students should have a computer, internet connection, account on a specific software/platform…(elearning)

26. Course Policies:

A- Attendance policies: following the school regulations.

B- Absences from exams and submitting assignments on time: following the school regulations.

C- Health and safety procedures: following the school regulations.

D- Honesty policy regarding cheating, plagiarism, misbehavior: following the school regulations.

E- Grading policy: following the school regulations.

F- Available university services that support achievement in the course: NA.

27. References:

A- Required book(s), assigned reading and audio-visuals:

- Blatt, H., Tracy, R. J., & Owens, B. E. (2006). *Petrology: Igneous, sedimentary, and metamorphic* (3rd ed.). W.H. Freeman.
- Winter, J. D. (2010). *Principles of igneous and metamorphic petrology* (2nd ed.). Pearson Education.

B- Recommended books, materials, and media:

- Wilson, M. (1989). *Igneous petrogenesis: A global tectonic approach*. Springer.
- Brown, G. C., & Mussett, A. E. (1993). *The interpretation of igneous rocks*. Chapman & Hall.
- White, W. M. (2013). *Geochemistry*. Wiley-Blackwell.
- Caddick, M. J., & White, R. W. (2021). *Using thermodynamic modeling in petrology*. Cambridge University Press.

28. Additional information:

	Signature:	Date:
Name of the Instructor or the Course Coordinator: **Dr. Najel Yaseen**	……..……	**25/04/2025**……
Name of the Head of Quality Assurance Committee/ Department	Signature: ……..……	Date: ……..……
Name of the Head of Department **Dr Bety Saqarat**	Signature: ……..……	Date: ……..……
Name of the Head of Quality Assurance Committee/ School of Science **Prof. Emad A. Abuosba**	Signature: ……..……	Date: ……..……
Name of the Dean or the Director **Prof. Mahmoud I. Jaghoub**	Signature: ……..……	Date: ……..……