The New Senior Secondary Curriculum for Sierra Leone

Subject Syllabus for Mining Industry & The Environment
Subject stream: Social and Cultural Studies

This subject syllabus is based on the National Curriculum Framework for Senior Secondary Education. It was prepared by national curriculum specialists and subject experts.

SSSC
Senior Secondary School Curriculum

Curriculum elements for Mining Industry & the Environment (an everyday subject)

The Senior Secondary School (SSS) Mining Industry curriculum provides essential ideologies in understanding the mining sector, its contributions to development, how it affects the environment and measures that are utilised to minimise the impacts. This syllabus introduces students both to basic geological and mining skills and understanding that enable them to be aware about the processes of mining, its contribution to local and national development, the environmental impacts as well as measures in managing environmental problems.

Rationale for the Inclusion of Mining & Environment in the SSS curriculum

a) The mining industry is an important subject in the senior secondary school curriculum in that it enables students to have an understanding of the mining industry as well as stimulate their interest in entrepreneurship and mining practice.
b) To promote knowledge about the environmental impacts of mining and the assessments and measures that are can be taken to resolve them
c) It exposes students to know about the Geology of Sierra Leone, and how the mining industry operates in the country
d) It enables students to develop an appreciation of the natural minerals

General Learning Outcomes

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

a) understand basic Geological and mining concepts
b) explain the economic benefits of mining locally and nationally
c) discuss the various types of mining
d) understand the Geology, mining procedures and regulations of Sierra Leone
e) demonstrate basic geological mapping skills
f) understand corporate social responsibility as well as the community's role in mining
g) explain the environmental and social impacts of mining
h) increase knowledge of, and ability to use and apply, appropriate skills and techniques including fieldwork
i) appreciate the essence of conducting an environmental impact assessment
j) examine some health and safety issues in mining

Suggest Content (Topics/Themes)

A range of themes is suggested for the following components of the syllabus:

1. An introduction to the mining industry and basic Geology
2. History of mining and distribution of minerals
3. Types and phases of mining
4. Environmental social impacts of mining, health and safety
5. Environmental impact assessment, minerals; a blessing or curse

Structure of the Syllabus Over the 3-Year Senior Secondary Cycle

	SSS 1	SSS 2	SSS 3
Term 1	**An introduction to the mining industry and major industrial minerals** • Meaning and branches of mining • Definition of terms in Mining • Classification of minerals **Importance of Minerals** • Importance of minerals • Case study of mineral with high economic importance • Gold • Diamond • Bauxite • Iron ore **History of Mining and Distribution of minerals** • History of mining • Global distribution of minerals	**Basic Geology** • Definition of Geology and its scope • Relationship between Geology and Mining • Structure of the earth • Rocks and rock types • Rock forming minerals • Physical and chemical properties of rock forming minerals • Rock cycle • Weathering • Collection and collation of geological data • Interpretation of topographical maps • Drawing of simple geological cross sections	**Geology of Sierra Leone** • The basement a) Syn-kinematic granite migmatite b) Late kinematic granite c) Homogeneous syn-kinematic granite • The intrusive • The super crustal a) Kambui Super Group b) Kasila Group c) Marampa Group d) Rokel River Group e) Saionya Scarp Group f) Bullom Group • Mining activities in Sierra Leone **The mining Act of Sierra Leone**

	• Distribution of minerals in Sierra Leone		
Term 2	**Benefits of mining** • Revenue – profit in taxes, royalties and fees • Infrastructural development – construction of roads, rails and ports etc. • Mining and Economic Development **Types of mining** • Surface/ open pit • underground • Deep sea / dredge	**Mining and local development** • Corporate social responsibility • Community development initiatives • The challenges of community development initiatives • The role of governments in community development initiatives **Phases of a mining project** • Mine Exploration • Mine development • Mining operations (mining and mineral processing) • Mine closure and land reclamation	**Resettlement and Relocation of Residents in Mining Areas** **The role of civil society in mining** **Artisanal Mining in Sierra Leone** • History and evolution of artisanal mining in Sierra Leone • Artisanal mining and its contribution to local development in Sierra Leone
Term 3	**Environmental impacts of mining** • Air quality • Water contamination • Erosion and sedimentation • Pollution • Deforestation • Loss of fertile land • Loss of wildlife • Loss of habitat **Environmental and social impact assessment (ESIA)**	**Social impacts of mining** • Migration • Human displacement and resettlement • Impact on public health • Loss of livelihood • Loss of cultural and aesthetic resources • Loss of access to clean water	**Health and the safety in mining** • Health hazards in mining • Safety requirements/ measures in mining • Safety equipment and apparel used in mining – personal protective equipment (PPE) • Common diseases associated with the mining industry • Administering simple first aid/drugs / dressing materials • Guideline for accident reporting, steps for environmental control **Minerals: A blessing or curse** • A case study of Sierra Leone and Botswana

Teaching Syllabus

Senior Secondary School Year 1

Topic/Theme/Unit	Expected learning outcomes	Recommended teaching methods	Suggested resources	Assessment of learning outcomes
An introduction to the mining industry and major industrial minerals • Meaning of mining • Definition of terms in Mining • Classification of mineral resources • Properties of minerals	At the end of the topic, students will be able to: a) Define mining b) Define key terms used in mining c) Classify minerals	• Start a discussion with students' by asking them what they know about mining • Brainstorming session (e.g., "When the term mining is mentioned, what comes to your mind?" "What has influenced you to imagine these thoughts?" • How can you classify minerals, discuss each category, and give examples? • Explain the concept of mining. Define terms such as minerals, gangue, tailings, ore, etc, the classification of mineral resources i.e., metallic, non-	• Short videos on introduction to minerals on YouTube • Learn more about minerals at Geology.com • Course Guidebook • Flash cards for definition of terms	a) Class presentation of a poster on the classification of mineral resources b) Short answer questions: i. What is a mineral ii. Show the difference between gangue and tailings iii. List the properties of a mineral

		metallic, fossil fuels etc. • Summarise key points in the lesson for students to copy.		
Importance of Minerals • Importance of minerals • Case study of mineral with high economic importance • Gold • Diamond • Bauxite • Iron ore	At the end of the unit, students will be able to: a) Examine the importance of mineral resources b) Discuss key mineral resources with high economic importance	• Start a discussion by giving scenarios about various items that are manufactured using minerals such as steel, cement, crushed rocks used for construction, jewelleries from diamond, gold etc., computers, cars, mobile phones and nearly everything that we use in the world today is manufactured making use of some minerals indicating how important they are. • Small group discussions wherein they can look at minerals such as gold, diamond, iron ore	• Presentation and video on importance of mining • Course Guidebooks	• Presentation of poster on importance of minerals

		etc. and their importance		
History of Mining and Distribution of minerals • History of mining • Global distribution of minerals • Distribution of minerals in Sierra Leone	By the end of this topic, students will be able: • The history of mining • The distribution of key minerals globally • The distribution of minerals in Sierra Leone	• Talk and chalk explanation on the history of mining • Use of global map and map of Sierra Leone to talk through the distribution of minerals globally and in Sierra Leone	• Course guidebook • Youtube video on the distribution of minerals in the world A global map showing mineral distribution • A map of Sierra Leone showing the distribution of minerals	• Short answer questions on mineral distribution • Presentation on mineral
Benefits of mining • Revenue – profit in taxes, royalties, and fees • Infrastructural development – construction of roads, rails, and ports etc. • Mining and Economic Development	By the end of the topic, students will have an be able to: • Explain the financial and infrastructural benefits of mining • Discuss mining and economic development	• Question and answer session to take students from known to the unknown. E.g., a) List some benefits of mining b) What is the relationship between mining and economic development?	• Course Guidebook • Youtube	• Group Presentation group presentation on the benefits of mining in Sierra Leone
Types of mining • Surface / open pit • Underground	By the end of this topic, students will be able to: • Explain about the key types of mining • Give some advantage and	• Power point presentation explaining surface, underground and ocean mining using making use	• Videos from Youtube, Geology.com and National Geographic on types of mining	• Presentation of findings from field work

	disadvantages of the various types of mining	of audio visuals for better understanding	• Course guidebook • Field visit to a nearby mining site	
Environmental impacts of mining • Air quality • Water contamination • Erosion and sedimentation • Pollution • Deforestation • Loss of fertile land • Loss of wildlife • Loss of habitat	At the end of this topic, students will be able to: • Explain important environmental impacts like water contamination, deforestation, loss of wildlife and erosion often experienced as a result of mining activities.	Take students out to a nearby mining site and ask them to record some of the negative effects of mining that they observe: Small group discussions and presentation of what students observed during the field trip.	Course guidebook Youtube video on the environmental impacts of mining Camera to capture pictures during field work.	Short answer questions Submission of report from field work

Environmental and social impact assessment (ESIA) Definition Phases (steps, screening, scoping, impact assessment & mitigation, impact management, the ESIA report, review & licensing, monitoring)	At the end of this topic, students will be able to: • Explain what an ESIA is and the stages of an ESIA • Explain the importance of undertaking an ESIA • The importance of involvement and participation for all stakeholder	• Short video of ESIA from Youtube • Small group discussions and a summarized presentation of what they have learnt from the video. E.g. a) What is an ESIA? b) What are the phases of an ESIA c) What circumstances would an ESIA be rejected or disapproved? • Chalk and talk by first drawing illustrations on the board showing the various stages of an ESIA followed by detailed explanation	Youtube videos Course book Posters	Group work to review and summarise a Sample ESIA report

Senior Secondary Year 2

Basic Geology • Definition of Geology and its scope • Relationship between Geology and Mining • Structure of the earth • Rocks and rock types • Rock forming minerals • Physical and chemical properties of rock forming minerals • Rock cycle • Weathering • Collection and collation of geological data • Interpretation of topographical maps • Drawing of simple geological cross section	At the end of the topic, students will be able to: • Define Geology • Understand the relationship between Geology and mining • Explain the internal structure of the earth • List the types of rock and their characteristics • Undertake basic geological data collection • Draw basic geological cross sections	• Presentation of a video on basics of geology, rocks, weathering, geological cross sections etc. • Ask students questions to know what they have learnt. E.g., what Geology; what are rocks; List the types of rocks; • Chalk and talk for clear understanding of geological concepts • Field work to identify some rock types and collect rock samples	Youtube video on deserts from Course book Resources from Geology.com, National Geographic and Minerals Education Coalition websites	• Presentation of field work • Practical on drawing geologic cross sections and • interpretation of topographical maps
Mining and local development • Corporate social responsibility • Community development initiatives • The challenges of community development initiatives • The role of governments in community development initiatives	At the end of the topic, students will be able to: • Corporate social responsibility is • Explain about community development initiatives • Discuss the role of governments in community development	• Youtube video on corporate social responsibility in mining • Small group discussion and presentation • Chalk and talk	• Course book • Youtube video • poster	Role play where students will represent mining company, government and community and how they dialogue on initiatives for development in the community

Phases of a mining project • Mine Exploration • Mine development • Mining operations (mining and mineral processing) • Mine closure and land reclamation	At the end of the topic, students will be able to: • Identify and discuss the various stages of a mining project	• PowerPoint presentation including audio visuals for clear understanding of the topic	• Course guidebook • Youtube videos showing the stages of mining	Short answer questions
Social impacts of mining • Migration • Human displacement and resettlement • Impact on public health • Loss of livelihood • Loss of cultural and aesthetic resources • Loss of access to clean water	Explanation on the social impacts of mining bringing a scenario that will vividly indicate how communities can be affected socially from mining activities	Field trip to a mining site that had to resettle some communities. E.g., Ferengbeya, Wondugu and Foria in Tonkolili district which were relocated by African Minerals to Ferengbeya II	• Course guidebook • Video showing social impacts of mining	Presentation of findings from the field work

Senior Secondary Year 3

Geology of Sierra Leone • The basement a) Syn-kinematic granite migmatite b) Late kinematic granite c) Homogeneous syn-kinematic granite • The intrusive • The super crustal a) Kambui Super Group b) Kasila Group c) Marampa Group d) Rokel River Group e) Saionya Scarp Group f) Bullom Group • Mining activities in Sierra Leone **The mining Act of Sierra Leone**	At the end of this topic, student will be able to: • Explain about the Geology of Sierra Leone • Explain the mining activities of Sierra Leone • Examine mining act of Sierra Leone	Cross country field work to observe the various types of rocks in the country	maps of Sierra Leone showing mineral deposits and geology You tube video Course guidebook Camera to take pictures of sites	Group presentation of field work
Artisanal Mining in Sierra Leone • History and evolution of artisanal mining in Sierra Leone • Artisanal mining and its contribution to local development in Sierra Leone • The use of children and women in artisanal mining	At the end of the topic, students will be able to: • Explain the history and evolution of artisanal mining in Sierra Leone • Discuss the contribution of artisanal mining to local development	Field trip to a nearby artisanal mine site (e.g., gold mine in Tane chiefdom Tonkolili or Diang chiefdom Koinadugu, Diamond mine in Kono	Youtube video on small scale and artisanal mining	Presentation from field work
Health and the safety in mining • Health hazards in mining • Safety requirements/ measures in mining	At the end of the topic, students will: • Have an understanding of	• Explanation through the use of a power point presentation on	Youtube videos on health and safety in mining	Presentation of observation from the field

• Safety equipment and apparel used in mining – personal protective equipment (PPE) • Common diseases associated with the mining industry • Administering simple first aid/drugs / dressing materials • Guideline for accident reporting	health hazards in mining • Basic safety measures in mining • Administration of simple first aid etc.	health hazards, safety equipment in mining, common diseases etc. with audio visuals for better understanding • Fieldwork where students will observe health and safety measures in a mining site		