| | PLO 1: Students will master basic concepts and vocabulary in …… | | | | | |
|---|---|---|---|---|---|---|
| | plate tectonics | origin and classification of rocks and minerals | geological time scale & its relation-ship to geologic & evolutionary events | geophysical properties of the Earth and crustal deformation | processes that shape the surface of the Earth | environmental hazards and issues |
| **Required Courses** | | | | | | |
| GEOL 111-111L | I | I | I | I | I | I |
| GEOL 112-112L | D | D | D | D | | |
| GEOL 212 | | M | | | | |
| GEOL 320 | | M | | | | |
| GEOL 340 | | M | M | | | |
| GEOL 342 | D | | | | M | D |
| GEOL 330 | | | | M | | |
| GEOL 370 | | | | | | |
| GEOL 445 | | | | | | |
| GEOL 495A-B | | | | | | |
| **Elective courses (select 4)** | | | | | | |
| GEOL 300 | | | | | | M |
| GEOL 344 | | | | | D | M |
| GEOL 352 | | | | | | |
| GEOL 360 | | | | | | D |
| GEOL 431 | M | | M | | | |
| GEOL 432 | M | | D | M | | |
| GEOL 450 | | | | | D | D |
| GEOL 460 | | | | | | D |
| GEOL 470 | | M | | | | D |
| **Required Supporting Courses** | | | | | | |
| ENG 225 | | | | | | |
| MATH 241-242 | | | | | | |
| CHEM 161-162 + labs | | | | | | |
| PHYS 170-272 + labs | | | | | | |

| | PLO 2: Students will accurately observe and record geological features and processes | PLO 3: Student will be competent in interpreting earth science data, including both qualitative and quantitative analyses | PLO 5C: Students will be proficient at using computers for data analysis at a level consistent with current professional practice |
|---|---|---|---|
| **Required Courses** | | | |
| GEOL 111-111L | I | I | |
| GEOL 112-112L | D | D | |
| GEOL 212 | D | D | |
| GEOL 320 | M | M | |
| GEOL 340 | M | M | |
| GEOL 342 | M | M | |
| GEOL 330 | D | M | |
| GEOL 370 | M | M | |
| GEOL 445 | | D | M |
| GEOL 495A-B | | | |
| **Elective courses (select 4)** | | | |
| GEOL 300 | | | |
| GEOL 344 | D | | |
| GEOL 352 | | D | |
| GEOL 360 | | M | D |
| GEOL 431 NA | | | |
| GEOL 432 PT | | | |
| GEOL 450 | D | M | M |
| GEOL 460 | | M | |
| GEOL 470 | M | M | D |
| **Required Supporting Courses** | | | |
| ENG 225 | | | |
| MATH 241-242 | | I | |
| CHEM 161-162 + labs | | I | |
| PHYS 170-272 + labs | | I | |

| | PLO 4: Students will express earth science concepts in writing | PLO 5A: Students will be proficient at locating and interpreting scientific literature | PLO 5B: Students will be proficient at giving oral presentations |
|---|---|---|---|
| **Required Courses** | | | |
| GEOL 111-111L | I | | |
| GEOL 112-112L | D | I | |
| GEOL 212 | | | |
| GEOL 320 | D | | |
| GEOL 340 | D | | |
| GEOL 342 | D | D | |
| GEOL 330 | | | |
| GEOL 370 | M | | |
| GEOL 445 | | | |
| GEOL 495A-B | | M | M |
| **Elective courses (select 4)** | | | |
| GEOL 300 | | D | D |
| GEOL 344 | | D | D |
| GEOL 352 | | | |
| GEOL 360 | | | D |
| GEOL 431 | M | M | |
| GEOL 432 | M | M | |
| GEOL 450 | | | |
| GEOL 460 | | | |
| GEOL 470 | | | |
| **Required Supporting Courses** | | | |
| ENG 225 | I | I | |
| MATH 241-242 | | | |
| CHEM 161-162 + labs | | | |
| PHYS 170-272 + labs | | | |

| | PLO 1: Students will master basic concepts and vocabulary in …… | | | | | |
|---|---|---|---|---|---|---|
| | plate tectonics | origin and classification of rocks and minerals | geological time scale & its relation-ship to geologic & evolutionary events | geophysical properties of the Earth and crustal deformation | processes that shape the surface of the Earth | environmental hazards and issues |
| **Required Courses** | | | | | | |
| GEOL 111-111L | I | I | I | I | I | I |
| GEOL 112-112L | D | D | D | D | | |
| MARE 201 or ASTR 180 | | | | | | |
| GEOL 212 | | M | | | | |
| GEOL 320 | | M | | | | |
| GEOL 445 | | | | | | |
| GEOL 495A-B | | | | | | |
| **2-4 additional core cores** | | | | | | |
| GEOL 340 | | M | M | | | |
| GEOL 342 | D | | | | M | D |
| GEOL 330 | | | | M | | |
| GEOL 370 | | | | | | |
| **Elective courses (select 3-5)** | | | | | | |
| GEOL 300 | | | | | | M |
| GEOL 344 | | | | | D | M |
| GEOL 352 | | | | | | |
| GEOL 360 | | | | | | D |
| GEOL 431 | M | | M | | | |
| GEOL 432 | M | | D | M | | |
| GEOL 450 | | | | | D | D |
| GEOL 460 | | | | | | D |
| GEOL 470 | | M | | | | D |
| GEOG 300 | | | | | | D |
| GEOG 319 | | | | | | M |
| GEOG 470 | | | | | | |
| MARE 425 | | | | | | |
| MARE 461 | D | | | | | |
| SOIL 304 | | | | | | D |
| **Required Supporting Courses** | | | | | | |
| MATH 125 | | | | | | |
| CHEM 151-151L | | | | | | |
| PHYS 151-151L | | | | | | |

| | PLO 2: Students will accurately observe and record geological features and processes | PLO 3: Student will be competent in interpreting earth science data, including both qualitative and quantitative analyses | PLO 5C: Students will be proficient at using computers for data analysis at a level consistent with current professional practice |
|---|---|---|---|
| **Required Courses** | | | |
| GEOL 111-111L | I | I | |
| GEOL 112-112L | D | D | |
| MARE 201 or ASTR 180 | | I | |
| GEOL 212 | D | M | |
| GEOL 320 | M | M | |
| GEOL 445 | | D | M |
| GEOL 495A-B | | | |
| **2-4 additional core cores** | | | |
| GEOL 340 | M | D,M | |
| GEOL 342 | M | D,M | |
| GEOL 330 | D | M | |
| GEOL 370 | M | M | |
| **Elective courses (select 3-5)** | | | |
| GEOL 300 | | | |
| GEOL 344 | D | | |
| GEOL 352 | | D | |
| GEOL 360 | | M | D |
| GEOL 431 | | | |
| GEOL 432 | | | |
| GEOL 450 | D | M | M |
| GEOL 460 | | M | |
| GEOL 470 | M | M | D |
| GEOG 300 | | D | |
| GEOG 319 | | | |
| GEOG 470 | | M | M |
| MARE 425 | | D | |
| MARE 461 | | D | |
| SOIL 304 | | D | |
| **Required Supporting Courses** | | | |
| MATH 125 | | I | |
| CHEM 151-151L | | I | |
| PHYS 151-151L | | I | |

| | PLO 4: Students will express earth science concepts in writing | PLO 5A: Students will be proficient at locating and interpreting scientific literature | PLO 5B: Students will be proficient at giving oral presentations |
|---|---|---|---|
| **Required Courses** | | | |
| GEOL 111-111L | I | | |
| GEOL 112-112L | D | I | |
| MARE 201 or ASTR 180 | | | |
| GEOL 212 | | | |
| GEOL 320 | D | | |
| GEOL 445 | | | |
| GEOL 495A-B | | M | M |
| **2-4 additional core cores** | | | |
| GEOL 340 | D | | |
| GEOL 342 | D | D | |
| GEOL 330 | | | |
| GEOL 370 | M | | |
| **Elective courses (select 3-5)** | | | |
| GEOL 300 | | D | D |
| GEOL 344 | | D | D |
| GEOL 352 | | | |
| GEOL 360 | | | D |
| GEOL 431 | M | M | |
| GEOL 432 | M | M | |
| GEOL 450 | | | |
| GEOL 460 | | | |
| GEOL 470 | | | |
| GEOG 300 | | | |
| GEOG 319 | | | |
| GEOG 470 | | | |
| MARE 425 | | | |
| MARE 461 | | | |
| SOIL 304 | | | |
| **Required Supporting Courses** | | | |
| MATH 125 | | | |
| CHEM 151-151L | | | |
| PHYS 151-151L | | | |

| SCALE | Program Learning Outcome 1:<br><br>Master basic vocabulary and concepts. |
|---|---|
| 4—Exceptional | Can accurately define scientific terms used in upper division textbooks and use these terms in written or oral communication. Can explain concepts in detail and apply these concepts using information from case studies. |
| 3—Competent | Can accurately define and explain most scientific terms and concepts found in introductory textbooks and some of the terms and concepts found in upper division textbooks. Capable of using most of these terms and concepts in written or oral communication. |
| 2—Emerging | Can accurately define and explain many of the scientific terms and concepts found in introductory textbook. |
| 1--Beginning | Can accurately define and explain some of the scientific terms and concepts found in introductory textbook. Explanations lack detail and some definitions or explanations are not accurate. |

| SCALE | Program Learning Outcome 2:<br><br>Students will accurately observe and record geological features and processes |
|---|---|
| 4—Exceptional | Written observations and sketches are accurate, insightful, very detailed, and very comprehensive. Observations are kept separate from interpretations. Sketches are accurate, detailed, neat, and informative. |
| 3—Competent | Written observations and sketches are accurate, relevant, detailed, and comprehensive. Observations are kept separate from interpretations. Sketches are accurate, detailed, and informative. |
| 2—Emerging | Written observations lack detail and there are many relevant facts that student does not mention. Sketches fail to illustrate all the main features of a landscape, sample, or process. Student attempts to distinguish between facts and Interpretations, but is not always successful. |
| 1--Beginning | Written observations lack detail and there are many relevant facts that student does not mention. Sketches fail to illustrate the main features of a landscape, sample, or process. Interpretations are confused with facts. |

| SCALE | Program Learning Outcome 3:<br>**Student will be competent in interpreting earth science data, including both qualitative and quantitative analyses.** |
|---|---|
| 4—Exceptional | Student independently generates viable hypotheses that are motivated by results of previous studies. Student is consistently competent (>80%) in interpreting earth science data (as given below under "competent"). |
| 3—Competent | With prompting, student generates viable hypotheses that are motivated by results of previous studies. Performs units conversions in order to compare data across studies. Distinguishes between relevant and irrelevant information. Eighty percent of the time is able to competently perform the following: Able to correctly read ternary diagrams, stereonets, scatter plots, time series, plots of grain size distribution, topographic maps, geologic maps, and geologic cross-sections. Able to classify rock and sediment samples based on quantitative measurements. Can infer plausible origin of rocks based on observable properties and local/regional context. Can infer plausible geologic history or depositional environment based on local and regional geologic data. Can classify landforms based on morphology, composition, and regional context, and identify most likely formative processes for these landforms. |
| 2—Emerging | In addition to "beginning skills", is able to identify major features on geologic maps and construct rudimentary geologic histories from these maps. With 80% accuracy is able to identify well-preserved fossils from easily recognizable taxa. |
| 1--Beginning | Can identify the main features depicted on topographic maps. With 75% accuracy is able to classify rock samples into about 15 major categories, and identify about ten common minerals. Can identify common volcanic landforms and the eruptive processes associated with them. |

| SCALE | Program Learning Outcome 4:<br>**Students will express earth science concepts in writing** |
|---|---|
| 4—Exceptional | Writing is organized, appropriate to the audience, and appropriate for the purpose of the assignment. Descriptions and explanations are relevant, complete, and accurate. Prose is clear, concise, precise, grammatically-correct and highly readable. Follows appropriate conventions for formatting, citation, and reference list. |
| 3—Competent | Writing is appropriate to the audience and the purpose of the document or communication. Descriptions and explanations are relevant, complete, and accurate, with only small omissions or inaccuracies. Prose is mostly clear, reasonably concise, and is grammatically-correct with only a few lapses. Difficult concepts are explained clearly, albeit awkwardly. Follows appropriate conventions for formatting, citation, and reference list, with occasional lapses. Non-native speakers are able to get their point across even if the idiom is awkward. |
| 2—Emerging | Writing partly addresses the needs of the audience and the purpose of the assignment, Addresses some--but not all--of the information that should be conveyed and may occasionally include irrelevant information. In places it is not clear what the writer is trying to say. Writing is not concise and could be improved by stronger organization. Prose contains some grammatical errors and documents do not follow all the conventions for formatting, citation, and reference list. |
| 1--Beginning | Writing fails to take the needs of the audience into account and does not address all relevant information that should be conveyed. Contains irrelevant information. It is not clear what the writer is trying to say. Lacks organization, is repetitive (longer documents), and rambles. Prose contains frequent grammatical errors and documents make no effort to follow conventions for formatting, citation, and reference list. |

| SCALE | Program Learning Outcome 5a<br>**Students will be proficient at locating and interpreting scientific literature** |
|---|---|
| 4—Exceptional | Can classify articles as belonging to the primary, secondary, or grey literature, and recognizes the strengths and weaknesses of these three categories. Uses databases effectively to conduct comprehensive literature searches. Able to summarize the aims, methods, assumptions, and results of scientific articles and identify implict hypotheses. Able to critique selected scientific articles. Capable of finding the best sources from which to obtain information for answering specific questions. |
| 3—Competent | Can classify articles as belonging to the primary, secondary, or grey literature, and recognizes the strengths and weaknesses of these three categories. Can summarize the methods and results of less technical scientific papers and identify hypotheses that are explicitly stated. Can locate articles that provide information about specific topics; these are not necessarily the best articles, however. |
| 2—Emerging | Can summarize key points from less technical scientific articles. Can locate some scientific papers on a given topic; these are not necessarily the best sources, however. Recognizes and rejects the grey literature. |
| 1--Beginning | Does not discriminate between the primary, secondary, and grey literature. Cannot or does not use databases that index scientific articles. Comprehension of the primary literature is limited by lack of understanding of scientific vocabulary and concepts. |

| SCALE | Program Learning Outcome 5b<br>**Students will be proficient at giving oral presentations** |
|---|---|
| 4—Exceptional | Content and length meets the requirements of the assignment. Content is relevant, accurate, and information-dense. The vocabulary, background information, and explanation of concepts is appropriate for the intended audience. Information is provided in a logical order. Slides are legible, logical and attractive. The number of slides, amount of text, and number of illustrations is appropriate. Attributes—however minimally—the sources of Illustrations, data, and tables. Speech is audible and speaker maintains eye contact with the audience. Natural delivery at an appropriate pace without reading the slides or a script. There are no inappropriate pauses, interrupters, or annoying gestures. The audience is able to understand the ideas of the speaker. |
| 3—Competent | Content and length meets the requirements of the assignment. Content is relevant and accurate but may be superficial in places. The vocabulary, background information, and explanation of concepts is mostly appropriate for the intended audience. Most of the information is provided in a logical order. Most slides are legible and do not have excessive text. Sources of Illustrations and data are acknowledged on some slides. Speech is audible and speaker establishes eye contact with the audience some of the time. Speaker does not read the slides or a prepared script. The audience is able to understand most of the speaker's main ideas. |
| 2—Emerging | Content partly meets the requirements of the assignment. Some of the content is superficial. Speaker uses vocabulary or concepts that the audience is unfamiliar with. Background information is missing *or* the speaker devotes too much time to what the audience already knows. Poor organization makes it is difficult for the audience to follow the speaker's ideas. Some of the slides are not legible and/or do not use illustrations effectively. There is no attempt to acknowledge sources. Amount of eye contact is inadequate and time is too short or too long. |
| 1--Beginning | Talk is too short with superficial content or too long and deviates from the purpose of the assignment. The needs of the audience have not been considered. Many slides are not legible and text has been used when illustrations would be more effective. Speaker does not look and audience and reads from the slides or a prepared script. |

| SCALE | Program Learning Outcome 5c<br><br>**Students will be proficient at using computers for data analysis at a level consistent with current professional practice** |
|---|---|
| 4—Exceptional | Can use spreadsheets to do custom plots and analyze data statistically. Can import text files and organize data with clear documentation. Able to manage complex data sets, perform data analysis, and produce meaningful graphics using industry-standard GIS or remote sensing software. |
| 3—Competent | Can use spreadsheet to do custom plots; can use spreadsheet formulas, sort and re-organize data, and import text files. Can use industry-standard GIS or remote sensing software to perform simple tasks. |
| 2—Emerging | Can use spreadsheets to plot data but does not scale axes or label them appropriately. Can perform simple calculations and simple re-organization of data. Does not keep track of units. |
| 1--Beginning | Unable to use spreadsheets to plot data. Unable to use spreadsheets for simple calculations such as units conversions. |