

<b>Lecture No./Description</b>	<b>Topics</b>	<b>Lead</b>
<b>INTRODUCTION</b>		
<b>1 Course Overview</b> <b>Monday, Aug 22</b>	Discuss Owner, Lender and Private Equity Perspectives related to Mining Project Valuation; Introduce anticipated speakers and timing; Describe project/case study format; Our expectations for the course; Overview of Cost and Replacement methods; Course focus will be on the Income Approach; Define vocabulary of the FEL process and the typical role of the income approach in Conceptual, PFS and FS level studies  Key Points: Owner, Lender and Private Equity Roles; Income Approach; FEL Vocabulary  Background Reading: Valuation of Mineral Exploration Properties using the Cost Approach (Roscoe); Valuation of Mineral Properties with Mineral Resources: A review of Market-Based Approaches (Lawrence)	TB GM
<b>2 Project Successes and Failures</b> <b>Wednesday, Aug 24</b>	Owner and investor expectations, did a project deliver? Busang (Bre-X), Hycroft (Allied Nevada), Hope Bay (Newmont), Livengood (ITH), Mountain Pass (Molycorp), Eagle (RTZ), Galore Creek (Teck), Aguila (Gold Resources Corp), Mount Polley (Imperial Metals)	TB
<b>3 Semester Project Assignments</b> <b>Monday, Aug 29</b>		TB GM
<b>4 DCF Models in Practice</b> <b>Wednesday, Aug 31</b>	Coal and/or Iron Ore, Gold, Lithium Brines, Rare Earths, Copper, Uranium  Key Points: Different commodities tend to exhibit different "drivers" or uncertainties that influence income approach analysis; Examine specific examples that highlight different drivers;	TB
<b>MODEL CONSTRUCTION</b>		
<b>Part 1: Physicals</b>		
<b>Mine Production</b>	Resource Model; Mine Planning Overview - hard rock, in-situ, solution, brine; Primary and secondary products, dilution, level of detail, mine waste management; trade-off studies  Key Points: Uncertainties, Risks	
<b>5 Wednesday, Sept 7</b>	Practicing Resource Geologist (Guest Speaker)	TB
<b>6 Monday, Sept 12</b>	Practicing Mine Planner (Guest Speaker)	GM
<b>7 Wednesday, Sept 14</b>	In-Situ Resource and Mining - Estimating Methods, Overview of Mining Methods, equipment requirements, development schedules	TB

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<b>8 Process Recovery Monday, Sept 19</b>  Key Points:	Metallurgy (test work and technology), water balance, energy balance, reagent requirements, grade-recovery, waste residuals  Different commodities, different factors	TB
<b>9 Wednesday, Sept 21</b>	Practicing Metallurgical Engineer (Guest Speaker)	GM
<b>Part 2 The Four Cash Flows</b>		
<b>10 Revenue, Cash Flow 1 Monday, Sept 26</b>  Key Points:	Commodity specific  Sources, Uncertainties, Risks	GM
<b>11 Operating Costs (1 of 2) Cash Flow 2 Wednesday, Sept 28</b>  Key Points:	Direct Costs: Extraction, processing, support/infrastructure, smelting/refining, transportation  Cost Centre vs. Input (utilities, reagents, fuel, manpower, etc) views	GM
<b>12 Monday, Oct 3</b>	Private Equity Perspective (Guest Speaker)	TB
<b>13 Operating Costs (2 of 2) Cash Flow 2 Wednesday, Oct 5</b>  Key Points:	Indirect Costs: Exploration, Environmental Compliance, General & Administrative, Social Responsibility, Management Fees  Differentiate between Direct and Indirect Cash OpEx	GM
<b>14 Class Presentations Monday, Oct 10</b>	Reserved	
<b>15 Capital Cost Cash Flow 3</b>	<b>Initial:</b> Work Breakdown Structure (WBS): Direct, Indirect, EPCM, Contingency, Owners Costs, First Fills, Critical Spares, Commissioning Spares	GM
<b>16 Project Development Schedule Wednesday, Oct 12</b>	Basis for pre-production schedule, capital spend schedule, logistical risks, common errors, best practice  Practicing EPC Consultant (Guest Speaker)	TB
<b>FALL BREAK (OCTOBER 17 AND 18)</b>		
<b>17 Wednesday, Oct 19</b>	<b>Sustaining:</b> A/R, A/P, Inventories, VAT, Cash Balances. Tax Implications, Compare sustaining capex vs. maintenance opex	

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<b>18 Taxation Cash Flow 4 Monday, Oct 24</b>	Overview of Global Taxation Schemes	GM
Key Points:	Income Taxes, Mining Taxes, Mining Royalties, Other Taxes. US vs "Commonwealth" Depreciation Methods.	
Background Reading:	Corporate Income Taxes, Mining Royalties and Other Mining Taxes - A Summary of Rates and Rules in Selected Countries - PWC, June 2012	
<b>19 Closure Wednesday, Oct 26</b>	Surety Bond Estimates, Trends that impact magnitude and timing of closure costing, Use of DCF in estimation of AROs and Reclamation Liabilities	TB
Key Points:	Estimate accuracy, completeness, timing of expenditures	
<b>20 Project Sensitivity Monday, Oct 31</b>	Review uncertainty and risk factors, display/interpretation, escalated vs. constant dollar analysis, deterministic vs. probabilistic	GM
Key Points:	Standard and project-specific sensitivity assessment	
Background Reading:	Economic Evaluation & Investment Decision Methods (Stermole) - Chapter 5 (Escalated and Constant Dollars), Chapter 6 (Uncertainty and Risk Analysis);	
<b>21 Profitability Metrics Wednesday, Nov 2</b>	Opportunity cost of capital, NPV, IRR, MIRR, Payback, PI	GM
Key Points:	Discount rate as a measure of risk; Perspective on discount rate and level of importance for a metric varies based on who is taking the risk;	
Background Reading:	Valuation of Mineral Properties (Guarnera and Martin)	
<b>22 Class Presentations Monday, Nov 7</b>	Reserved	
<b>VALUATION</b>		
<b>23 Corporate Perspective Wednesday, Nov 9</b>	Guest Speaker	TB
<b>24 Royalties Monday, Nov 14</b>	Guest Speaker	GM
<b>25 Cost Benchmarking Wednesday, Nov 16</b>	Value of benchmarking operating and capital costs, factoring in scale and site-specificity to the extent feasible.	GM
Key Points:	Benchmarking vs. conceptual costing	

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Background Reading:	Industrial Megaprojects (Merrow) - Chapter 4 (Project Shaping)	
<b>26 Debt Financing Monday, Nov 21</b>	Lender perspective, coverage ratios, market trends	GM
<b>NON-CLASS DAY PRIOR TO THANKSGIVING BREAK (WEDNESDAY, NOV 23)</b>		
<b>27 Debt Financing in Practice Monday, Nov 28</b>	Guest Speaker	GM
<b>28 Environmental Wednesday, Nov 30</b>	Equator Principles and IFC Standards on Debt Financing	TB
Key Points:	Same basic DCF, much different perspective	
Background Reading:	Equator Principles III Final Document	
<b>29 Project Risk and Opportunity Register Monday, Dec 2</b>	Direct (associated with the mining activity) and Indirect (independent of the mining activity) risk assessments, Direct (Geology, Mining, Process, Costs) vs. Indirect (Commercial, Political, Force Majeure, Corporate).	GM
<b>30 Class Presentations Wednesday, Dec 4</b>	Reserved	