



UNIVERSITY OF TORONTO

Department of Economics (STG), ECO204 Summer 2023, Ajaz Hussain

ECO204 Summer 2023 Project “Gold Claims at Sturgeon Lake”

This is an individual, solo, project, which must be attempted, completed, and submitted by *you* alone. You cannot collaborate with or consult (to name a few) tutors/tutoring-agencies, and other individuals directly or indirectly (ex: Discourse groups, FB chats) nor utilize external sites/resources (ex: [Chegg.com](https://www.chegg.com)) even if these “sources” are cited. In other words, you must analyze the case using only the information in the case. Do not post “publicly visible” posts with project-related questions-answers on the 204 Ed Discussion board. You are always welcome to consult the ECO204 Summer 2023 course staff preferably during office hours.

“Project Case”	<ul style="list-style-type: none"> ➤ HBS Case: <i>Gold Claim at Sturgeon Lake</i> [with spreadsheet supplement]. ➤ Purchase/download case & spreadsheet from https://hbsp.harvard.edu/import/1055917
Project Components and Max Scores:	<ul style="list-style-type: none"> ➤ Excel model (macro-enabled): max score 11% of the overall course grade. ➤ Max 5-page business report with title page, one-page executive summary, and technical appendix: max score 11% of the overall course grade (title page does not count towards page length; executive summary does count towards page length; no restrictions on # of pages in technical appendix). ➤ “Presentation Slides and video”: max score 11% of the overall course grade.
When, Where, and How to Submit Your Project-Components:	<ul style="list-style-type: none"> ➤ Excel (no Apple “Numbers” files or “Google Sheets”): <ul style="list-style-type: none"> ➤ Deadline: 10 pm, Wed, Aug 9th through the “project-excel-tab” in Quercus assignments. ➤ Filename format: Lastname-Firstname.xlsm (macro-enabled Excel file) ➤ Max 5-Page business report in pdf format: <ul style="list-style-type: none"> ➤ Deadline: 10 pm, Tue, Aug 15th through the “project-report-tab” in Quercus assignments. ➤ Filename format: Lastname-Firstname.pdf (pdf file must be ocr ready). ➤ Max-10-minute Presentation video (posted on MyMedia or YouTube) with slides (in pdf format): <ul style="list-style-type: none"> ➤ Deadline: 10 pm, Tue, Aug 15th through the “project-slides-tab” in Quercus assignments. ➤ Prior to uploading slide deck, please upload presentation-video to MyMedia (please give access to eco.204@utoronto.ca) or YouTube and paste the video URL on the presentation title slide (reminder: you must appear throughout the presentation video). ➤ Filename format: Lastname-Firstname.pdf (pdf file must be ocr ready).
Penalties for late/”messed up”/”incorrect” submissions	<ul style="list-style-type: none"> ➤ Penalty for late submissions of any Project-Component: 50% of the maximum Project-Component score per day past the deadline. ➤ Penalty for “messed up/incorrect” submission of any Project-Component: <ul style="list-style-type: none"> ➤ Before the deadline: 10% of the maximum Project-Component score per “incident”. ➤ After the deadline: 50% of the maximum Project-Component score per “incident”.
Academic Code of Conduct:	<ul style="list-style-type: none"> ➤ It is <i>your</i> responsibility to read and abide by the Student Academic Code of Conduct. Please note that <i>any</i> attempt to “collaborate” with, or “receive/provide help” from/to other individuals/organizations, is a serious violation of the academic code of conduct.

Notes:

- Failure to submit all three project-components will automatically result in a grade of “zero” for the entire project.
- The “names” on the filename titles must be identical to the “names” in the Quercus system (please see the [syllabus](#) for penalties on using different names)
- Max # submission attempts allowed: one. In case of “problems/issues” with submissions -- please notify us by e-mail at eco.204@utoronto.ca and await further instructions (never, ever, e-mail project-components).
- We *may* arrange a meeting with you to “walk us” through your submissions.
- Please see the following policy as it relates to the report and slides: “Normally, students will be required to submit their course essays to the University’s plagiarism detection tool for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the tool’s reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University’s use of this tool are described on the Centre for Teaching Support & Innovation web site <https://uoft.me/pdt-faq>”

“Situation”

You are Andrew McKendry, the geologist in the case. Your mission is to “advise” your friend Grant Murphy on “whether there is enough

gold on [his] property to pursue an economically feasible mining opportunity”. You will “analyze/solve” the case in Excel and transmit your findings/recommendations in a max-5-page-business-report and max-10-minute video presentation (with slides).

“Advice on Deliverables”

➤ “The Problem and the Solution”

- “Draw” the decision tree and make sure what it is that you have calculate by backward induction. It’s a good idea to assume that major stages of the project are a year-long to facilitate Discount Cash Flow analysis.

➤ Excel Model:

- Please format and label Excel worksheets, “freeze pane views”, and color code “input parameter cells”.
- Notice the case gives “uncertain” intervals for most parameters. Check for typos.
- You may want to do a “benchmark” textbook model with the “average” or “expected” value of the parameters. In such a model, there is a single # for the *NPV* of your optimal decision.
- Next, you should do, say, 5,000 rounds of Monte-Carlo simulations with the parameters randomly chosen from their respective intervals – you may have to copy and hard paste values to “pin” down the numbers (because you’ll get a new set of numbers each time you press F9 or “save” the file.) In the Monte-Carlo simulation models, you will going to “derive” the histogram of potential *NPV* values (a much more realistic and powerful decision making tool).
- The command `=rand()` generates a random number between 0 and 1 [including 0 or 1].
- Pressing “F9” in Excel “recalculates” all formulas. For example, each time you click F9, the command `=rand()` will generate a new random number between 0 and 1.
- To pick a random number between a pre-specified “min #” and “max #”, use the command: `=min + rand()*(max – min)`
- The command `=randbetween(a,b)`, where *a* and *b* are integers, randomly picks an integer between *a* and *b* [including *a* or *b*].
- Watch the “vlookup” tutorials on the ECO 204 Excel [Youtube channel](#)
- Review “[Excel relative, absolute, mixed cell references](#)” (useful for “filling” formulas down or right).
- Here’s how you’ll forecast gold prices 10-years into the future: suppose you have gold price data from years 1 through *T* and want to forecast gold prices in years *T* + 1, *T* + 2, ..., *T* + 10. The “forecasting algo” is:

$$P_{T+1} = P_T(1 + \text{growth rate}_{T,T+1})$$

$$P_{T+2} = P_{T+1}(1 + \text{growth rate}_{T+1,T+2})$$

...

$$P_{T+10} = P_{T+9}(1 + \text{growth rate}_{T+9,T+10})$$

Where $\text{growth rate}_{t-1,t} = (P_t - P_{t-1})/P_{t-1}$. You will need to “forecast” $\text{growth rate}_{T,T+1}$ through $\text{growth rate}_{T+9,T+10}$. To do this, assume that the “population” or “probability model” growth rate of gold prices has a “Normal distribution” with mean = μ and variance = σ^2 which can be “estimated” by:

sample mean of gold price growth rates $\rightarrow \mu$

sample variance of gold price growth rates $\rightarrow \sigma^2$

With that, here’s how you will “forecast” future growth rates: start by noting that gold prices are “volatile”, tantamount to the growth rate of gold prices above/below the mean “at random”. This suggests, we should “pick” future growth rates at random from the underlying growth rates Normal distribution. To do this, use the Excel formula: `=norm.inv(rand(), mean, standard deviation)`

Aside: The Excel formula `=norm.inv(probability p, mean, standard deviation)` gives the value *x* such that *p* is the probability of the random variable *X* (where $X \sim N(\text{Mean}, \text{Variance})$) being less than or equal to *x* (i.e. $P(X \leq x) = p$). For example, to find the value of *x* such that $P(X \leq x) = 0.96407$ for $X \sim N(\text{mean}, \text{variance})$, use the Excel formula `=norm.inv(0.96407, mean, standard deviation)`. In this project, we are replacing *p* by `rand()` so that the formula `=norm.inv(rand(), mean, standard deviation)` will pick a random probability $p = \text{rand}()$ and the value of *x* such that $P(X \leq x) = p = \text{rand}()$.

➤ Max 5-Page Business Report [See Rubric below]:

- Must have a title page (not counted towards the page limit) with your name, student ID.
- Must have a one-page executive summary (written in plain, simple, succinct, jargon-free English for an “intelligent” person (who is not an Economist). Instead of “elastic demand”, you can say “price sensitive demand”; “segment-pricing” instead of “third-degree-price-discrimination”. For an excellent example of clear, simple writing but deep, complex “arguments”, check out [Warren Buffet’s 2023 Annual Letter to Shareholders](#).
- Your report can have a technical-appendix (no restrictions on length).
- In your business-report, pitched at the “intelligent lay(wo)man”, explain the “problem”, the “analytical-methodology”, and “results” IN PLAIN ENGLISH. *You MUSTN’T refer the reader to the Excel file for key data, results, and figures; indeed, it’s better to*

present key results/data/figures *in* the business-report itself. There are no rules on font, font size, spacing, margins, but needless to say, please exercise common sense.

- Incidentally, there are many ways to “distinguish” your project from other projects. For example, you could investigate whether the NPV histogram is affected by:
 - “wiggling” average and/or range of the cost of drilling, or conducting a sensitivity analysis of “discount factors” could try playing around with the cost of drilling or discount factor to see if that makes a big difference to the qualitative conclusions.
 - “shifting” the interval of the probability of successfully building the access road (i.e. does it matter if the $P(\text{Access Road Success})$ is uniformly distributed between [10%, 30%] versus [40%, 60%]?

➤ **Max 10-Minute Video Presentation with Slides** [See Rubric below]

- Must have a title slide with your name, student ID, and the URL of your Presentation video.
- You must appear throughout the presentation on every slide (maybe bottom right?)
- Please don't read “off” of slides.

PAPER GRADING RUBRIC				
	Excellent	Good	Fair	Problematic
Score:	3	2	1	0
Economic Argument, Concepts & Evidence	Clearly stated argument & concepts. Economic reasoning is sound and indicates thorough understanding of concepts discussed in class.	Fairly clear and convincing argument. Adequate use of economic concepts. Demonstrates understanding of topics discussed in class.	Argument is confusing or contradictory. Weak definition/application of economic concepts. Demonstrates some understanding of topics discussed in class.	No clear argument. Confused or no use of economic concepts. Poor quality and little if any displayed evidence of understanding of topics discussed in class.
Organization & Flow	Each main point is written in a separate paragraph, in a logical order. Article closes with a clear and convincing call to action.	Each reason is written in paragraphs, but not necessarily separate. Closing gives a fairly clear and convincing call to action.	Reasons are not written in distinct paragraphs. Closing gives a call to action, although not well supported.	Reasons are not written in good paragraphs and have questionable order. No clear or convincing call to action at close.
Writing, Clarity, Conciseness, Sentence Structure, Grammar, Active Voice, interest to Reader	Easy to read, even for a non-specialist. Writing enhances understanding and interest. Short, clear, correctly structured sentences with active voice throughout. Minimal (if any) errors.	Mostly easy to read. Mostly short, clear, correctly structured sentences with active voice. A few minor errors.	Sentence/word level problems get in the way of understanding, distracting reader in places. Some passive voice and/or jargon.	Significant sentence/word level problems make it difficult for reader to understand argument. Considerable passive voice and/or jargon.

PRESENTATION GRADING RUBRIC				
	Excellent	Good	Fair	Problematic
Score:	3	2	1	0
Case Analysis: Arguments, Evidence, Understanding	Clearly identifies salient issue[s] in case. Effective and forceful arguments based on solid economic and (if applicable) econometric analysis. Demonstrates sound understanding of issues and economic/econometric concepts. Clear recommendations and/or findings.	Adequate identification of salient issue[s] in case. Somewhat effective arguments based on adequate use of economic and (if applicable) econometric analysis. Demonstrates adequate understanding of issues and economic/econometric concepts. Adequate recommendations and/or findings.	Inadequate identification of salient issue[s] in case. Poor and/or invalid arguments based on sparse use of economic and (if applicable) econometric analysis. Demonstrates inadequate and/or confused understanding of issues and economic/econometric concepts. Inadequate recommendations and/or findings.	Misidentifies salient issue[s] in case. Incorrect arguments which are not based on economic and (if applicable) econometric analysis. Demonstrates little to no understanding of issues and economic/econometric concepts. Lacks recommendations and/or findings.
Organization & Flow: Clarity, Conciseness, Structure, Flow, Grammar, Interest to Audience	Presentation has excellent structure and flow. Slides are properly formatted and titled, and effectively and succinctly convey information and/or arguments. Data and econometric analysis (if applicable) presented clearly and effectively. Clear, effective tables, graphs, charts, etc. Excellent backup slides for the Q&A session effectively demonstrating “behind the scenes” analysis. Minimal (if any) errors.	Presentation has less than stellar structure and flow. Some issues with formatting and titles. Slides inadequately convey information and/or arguments. Inadequate presentation of data and econometric analysis (if applicable). Ineffective use of tables, graphs, charts, etc. Backup slides inadequate for Q&A session and ineffectively demonstrating “behind the scenes” analysis. A few minor errors.	Presentation has poor structure and flow. Major issues with formatting and titles. Slides fail to adequately convey information and/or arguments. Data and econometric analysis (if applicable) shoddily presented. Poorly organized tables, graphs, charts, etc. Backup slides completely inadequate for Q&A session and for demonstrating “behind the scenes” analysis. Many minor errors.	Presentation lacks structure and flow. Lots of major issues with formatting and titles. Slides do not convey information and/or argument. Data and econometric analysis (if any) poorly or not presented. Poor, ineffective, use of tables, graphs, charts, etc. No backup slides for demonstrating “behind the scenes” analysis. Many major errors.