**Guidelines for developing good seminar discussion questions (BIOL 416, Winter 2022)**

Developing good questions is a fundamental critical-thinking skill. The best seminars and lectures are often focussed on addressing a clearly articulated, high quality, thematic question. Likewise, good writing is often based around synthesising your thoughts into a clear, focussed question that then becomes the basis for the argument or thesis statement or specific research questions or hypotheses. Thus, being able to develop good questions is a fundamental component of learning how to ‘think like a scientist’, but more widely, it is an important life skill for any citizen.

Questions should be constructed so that they will likely lead to focussed, intelligent discussion that will move the seminar group toward some potential answer, or toward a more refined perspective on the issue/theme, or toward an even more refined question.

Study the assigned reading material carefully, and reflect on it. What really interests you about it, and why? Develop a question that would take you (and your audience) *beyond* the reading’s text. In other words, formulate a question, and then develop an answer... and use the ideas that arise in that initial answering process to further develop your original question so that is more refined, and probing, and therefore likely to lead to an interesting focussed discussion. This iterative cycle can be repeated several times. Good questions have the following features:

* Challenging – they contain ideas that are new and indicate an advance on what is stated in the text
* Original – they indicate clear deep thinking by the questioner, often including his/her own specific ideas
* Focussed/specific – they contain enough detail that they will narrow the discussion and constrain it from vague generalisations
* Rarely can be simply answered as ‘Yes’ or ‘No’, without adding some explanation. For example, don’t ask the reader what ‘he/she thinks’ (e.g. Do you think.....?) - instead put in your own thoughts and then pose the question as an assertion (E.g. If.... , then why/what/how....).
* Concise – Keep your text as focussed as possible... text length is NOT correlated with question quality. Recommendation: If your question absolutely needs some introductory text (and it may not!!), keep it to **no more than 2-3 sentences at most, followed by just one single question.**
* Questions that begin with ‘Why?’, and sometimes with ‘How?’ are often particularly engaging, focussed, and effective in developing a good discussion.

Some good sample questions:

1. The chapter emphasizes that the range of what determines the boundaries of an ecosystem is broad. Do you or any of my peers think that the microbiota in our gut along with other animal guts could be considered an ecosystem in itself? Or does it simply make more of a contribution to an ecosystem as it may or may not lack some parameters?
2. The textbook reading mentions how most ecosystems generate energy from the sun. but it also mentions how deep-sea systems derive energy from hydrothermal vents. How do other ecosystems without access to light generate energy? For example, caves, jungle floors under thick canopies, polar systems during twilight periods. And are these systems more resilient or vulnerable to changes/impacts to their system as well as neighbouring systems they interact with?
3. In the book by Jared Diamond titled ‘Collapse’ (the assigned reading for GPHY 317), Diamond theorizes a framework in which the collapse of societies is the result of a society’s inability to identify and perceive a threat as it arises- and this conversation makes me wonder that if we refuse to treat ecosystem science as a science, how can we perceive threats to our Earth and its ecosystems such as the precise effects of climate change?
4. Agriculture is causing a large removal of carbon from the soil, while simultaneously adding large amounts of nitrogen and phosphorus. In the presence of widespread land degradation, many farmers are switching to organic, rather than synthetic, amendments. In terms of soil nutrient cycling and the potential state of these soils, why might organic amendments be more beneficial than synthetic ones?
5. Considering decomposition is what primarily drives an ecosystem's ability to "recycle" nutrients back into useful forms of energy for organisms, could it possibly be beneficial to reduce decomposition rates within an ecosystem in order to sequester more carbon into the ecosystem(soil) despite the trade-off in productivity? Can an understanding of decomposition rates be used to aid reduction of atmospheric C emissions? Or would the associated limits on productivity be more detrimental to ecosystems than the current level of atmospheric C emissions?