Strategies to Improve Learning and Memory

The "science of learning" (also known as "learning science") is an emerging, interdisciplinary field that concerns itself with how the brain learns and remembers important information, such as knowledge, skills, and attitudes. The field has compiled evidence in support of a set of strategies that increase the effectiveness of our efforts - and hopefully habits - to learn. Below please find descriptions of four such strategies; an example of how to incorporate these strategies into a typical week; and, two sources of additional information about the science of learning. Please consider using these strategies throughout the course. I welcome any questions or discussion at any time. Thanks for your consideration!

Recommended learning-science strategies:
1. Distributed learning (also known as distributed practice and spacing)
In contrast to cramming, distributed learning is the practice of breaking up study or practice into multiple, brief sessions spread out over time. Ideally, at least one full-night's sleep would separate study sessions, as the brain does much of its processing and storing while we sleep. The essence of distributed practice is meaningful repetition of priority content spaced out over time.

2. Retrieval practice (also known as practice testing and test-enhanced learning)
In contrast to passive review (rereading notes, chapters, and articles), retrieval practice requires that we search our long-term memory to reveal what we recall about a topic from previous study. When we search our long-term memory for priority content, we focus our attention on the information (signaling its importance to the brain), and we give ourselves feedback to guide additional study.

3. Interleaving
In contrast to learning information unit-by-unit, interleaving is the practice of mixing the study of distinct but related information from a course each time that we study. We should mix things already learned (prior information) with things we are trying to learn (current information) and with things we are preparing to learn (upcoming information). By mixing prior, current, and upcoming information together, we force our brain to reconcile different aspects of a course and to develop a coherent sense of the information.

4. Elaboration
While consistency has some value when we are first learning something new, once we have a general grasp of priority information, we should vary where we study it, when we study it, and how we study it. The rationale is that we want to associate information with multiple internal and external cues, each of which might provide access to the information in the future. Additionally, the more senses that we use to interact with information, the more regions of the brain become part of the neural network that represents the information, and the easier it is to remember it.

Example of incorporating the strategies into a typical week's efforts in the course:
Given each week in the course begins on Friday, below is a sequence that one could follow that is consistent with the learning-science strategies described above. This is only an example; feel free to modify this given different and changing circumstances. The more meaningful interactions you have with priority information, and the more those interactions are spaced, the better for learning and memory.

Friday – Quiz yourself using the cumulative summary that becomes part of the weekly email and revise your project handout based on the discussion Thursday evening and the Friday email summary.

Saturday – With the syllabus prompts in mind, complete the reading assignment, making notes to inform your handout revisions and to support participation on Thursday evening.

Sunday or Monday – Revise your handout based on the readings from the current and previous week and depending on your group assignment, submit your project handout by 11:59 PM Monday evening.

Tuesday or Wednesday – Consider any feedback received on the project handout and adjust your project handout accordingly. Solidify your plan to participate on Thursday evening.

Thursday – Prior to the session, quiz yourself on notes from the reading assignment and participate actively in the synchronous discussion by updating the group on your project and/or asking questions about the readings.

Additional resources:

References in support of the strategies:
Dunlosky, J., Rawson, K. A., Marsh, E. J., Nathan, M. J., & Willingham, D. T. (2013). Improving Students' Learning With Effective Learning Techniques: Promising Directions From Cognitive and Educational Psychology. *Psychological Science in the Public Interest*, *14*(1), 4–58. https://doi.org/10.1177/1529100612453266

Weinstein, Y., Madan, C. R., & Sumeracki, M. A. (2018). Teaching the science of learning. *Cognitive Research: Principles and Implications*, *3*(1), 2–2. https://cognitiveresearchjournal.springeropen.com/articles/10.1186/s41235-017-0087-y

Link to a set of online videos and handouts about the strategies:
https://nursing.uconn.edu/info-for/current-students/learning-science-strategies-series/