

JSC301 H1S

Principles and Practices in Science Education

Draft Syllabus Spring 2019

The course will provide an introduction to the following topics related to effective science education and public outreach:

1. Knowledge, teaching, and learning
 - a. Cognitive and constructivist theories
 - b. Approaches to learning and teaching
 - c. Formal and Informal Education
 - d. Intellectual development and learning taxonomies
2. Curriculum, planning, and assessing
 - a. The Ontario school curriculum
 - b. Types of learning activity
 - c. Types of assessment for and of learning (diagnostic, formative, summative)
 - d. Creating different assessment types, grading rubrics, and evaluation surveys
3. Practical Considerations
 - a. Misconceptions and threshold concepts
 - b. Learning styles (fact and fiction)
 - c. Concept inventories
 - d. Communication strategies for teaching and outreach
4. Project Development and Presentation
 - a. Design considerations
 - b. Effective use of technology
 - c. Safety for labs and demonstrations

There is no specific textbook for this course. Instead, students will be provided with a variety of reading materials including: relevant reviews and original articles from the educational research literature; as well as websites, videos, and magazine articles related to course topics, including practical advice on learning activities and principles of effective communication. To aid students encountering educational and cognitive psychology research for the first time, study and discussion questions will be provided for key readings, which will be followed up with in-class discussion.

Course evaluation will be split between a culminating project (60%) and other activities (40%). Extensions may be granted if a reasonable request is made before the deadline; a late penalty of 5% per business day applies. Note that in order to accommodate different project types and provide scheduling flexibility, students will have various options on how and when their marks will be distributed as follows:

1. Individual class blogs (5%) – grading period will be weeks 2-12 of term
 - a. At least one *substantive* posting per week required

- b. Participation *via* comments and additional postings
2. Concept map assignment (5%) [January]
3. Written work (30%)
 - a. Essay on learning (~6-8 pages) 20% [mid-February]
 - b. News article (~1-2 pages) 5-10%* [February†]
 - c. Report on misconceptions *etc.* (~2-5 pages) 5-10%* [March]
4. Project – total of 60% of course grade, distributed as follows:
 - a. Draft proposal and outline (10%) [Mid Feb.]
 - b. Detailed design document (20%) [Early March]
 - c. Project presentation (in class or in the field) (15-20%‡) [Late March]
 - d. Final report (15-20%‡) [Last week of classes]

Notes:

- * Students will have the option of requesting individual re-weighting of these components
- † Due date may be changed depending on when the external speaker can come
- ‡ The weighting to be determined with individual student(s), depending on nature of project