Curriculum & Pedagogy in Elementary Science & Technology P/J
EDUC 5178

Monday:10-12:30 (Section 001); 12:30-2:30 (002); 2:30-4:30 (003)
Room #AUD 2038

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Calendar Copy:
Approaches to and strategies for the teaching of science in the elementary school grades. Course content focuses on curricula and pedagogies that are true to the nature of science, consistent with desired educational aims, and appropriate for young learners. Significant attention is paid to environmental and sustainability education. 2 hours per week, full year, .5 credit.

Course Description:
This is a curriculum science course designed by teachers, for learning teachers. It focuses on primary junior science in the Ontario classroom. The course will meet once a week, for a two-hour period. The course will follow a diverse format of lecture, discussion, presentations, and hands-on activities. The goal of this course is combine theory and practice; it will mirror, study, and engage directly with the PJ curriculum and give students a change to model and role-play what it means to be a science teacher and a science student.

Learning Outcomes:
The learning outcomes for this course address 6 key area listed in the Ontario Universities’ Undergraduate Degree-Level Expectations http://oucqa.ca/framework/appendix-1/

| 1. Depth & Breadth of Knowledge | Demonstrate a thorough understanding of the Ontario Science and Technology curriculum, Grades 1-6. Demonstrate an understanding of the intersection of technology, pedagogy and content knowledge for instruction, assessment, creation, collaboration, and communication. |

EDUC 5178
<table>
<thead>
<tr>
<th>Course Content and Activities</th>
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<tr>
<td><em>The syllabus is subject to change. In the case of any changes students will be informed well in advance</em></td>
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**Term 1**

<table>
<thead>
<tr>
<th>September 10</th>
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<tr>
<td><strong>Introduction to the Course, Assignments, and Each Other</strong></td>
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<tr>
<td>• What is science? Who is a scientist? What myths surround the notion of science? What should a ‘good science’ lesson look like?</td>
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<td>• How does a scientist utilize his head/hands/heart? How can you do this as a teacher with your students?</td>
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**Readings:**

- Achieving transformative sustainability learning: engaging head, hands and heart (Sipos, Battisti, and Grimm, 2006)
- Head, Heart and Hands Model for Transformative Learning: Place as context for changing sustainability values (Singleton, 2015)
Science and the Ontario Science and Technology Curriculum
- Recap: What is science?
- What are some myths/beliefs/stigmas that are held within this course of study?
- What are the Ontario curriculum goals of science in the primary and junior grades?
- What are the major strands that are taught?

Readings:
- The Ontario Curriculum Grades 1-8, Science and Technology, 2007 Reading front matter

Inquiry-Based Education
Possible guest lecture – TBA
- How do children think and learn in science?
- What is inquiry in science?

Readings:
- Inquiry Based Science Learning in Primary Education (Suduca, Bizoia and Gorghiub, 2015)
Assignment 1 DUE – Written Reflection of Article.

You will choose an article based on the themes discussed in previous classes (i.e. What is science, what myths exist in elementary science, inquiry based learning, nature of science education, how do children learn science etc.) There will be time in class to have a roundtable discussion about the important points, new ideas and how the article applies to science in the classroom. This is an important exercise in creating a community of practice and resource sharing among teachers. (15%)

Environmental Education Part 1

- How do you define environmental education? How can environmental education connect to topics in the primary/junior curriculum? What are the curriculum goals for environmental education?

Readings:

- Curriculum documents/teacher resources students should be aware of for environmental education:
  - Shaping our Schools, Shaping our Future
  - Acting Today, Shaping tomorrow
    http://www.edu.gov.on.ca/curriculumcouncil/ShapeTomorrow.pdf
- DEEPER – Deepening Environmental Education in Pre-Service Education Resource (Inwood and Jagger, 2014)
- Place Based education: The best of both worlds: A critical pedagogy of place (Gruenewald, 2003)
- Natural Curiosity: A teacher manual
- Ontario EcoSchools Tools and Resources
  https://www.ontarioecoschools.org/tools-resources/

***Reading Week #1***


**Effective Questions**

- What is an effective question?
- How do student questions drive inquiry?
- What is the role of teacher questions in inquiry learning?

**Readings:**

- Questioning Cycle: Making Student Thinking Explicit During Scientific Inquiry, NSTA Furtak, E. and Ruiz-Primo, M., *Science Scope*; Jan 2005; 28, 4; Education Database pg. 22
- Productive Questions: Tools for Supporting Constructivist Learning
- When to Answer the Question “Why?”

**Lesson Planning**

- How do I plan an effective science lesson based on what I know about how children learn?
- What are the components of an effective lesson?
- What role do questions and formative assessment play in an effective lesson?

**Readings:**

- Perspectives: Examining the Learning Cycle
- An Overview of the 5E Model: Why you should be using it in your classroom, August 2016
- Smarter Science: Introducing the Framework
- Teaching Science to English-as-Second-Language Learners
- Safety Mindedness in Science and Technology, STAO

**Lesson Deconstruction Workshop/Assignment 2**

In this workshop you will apply what you have learned about lesson planning. In groups, you will work collaboratively to deconstruct a science lesson. Then you will independently create a critical analysis of the lesson discussed as a group to hand in. This is designed to be an **in-class assignment**. (15%)
| November 5 | Assignment 3 DUE: Resource sharing.  
You will bring in a resource (idea, community connection for field trip, experiment etc.) to share with the class in groups. You will need to provide ideas for how it connects to the curriculum, specifically, when you would use it, why, how. These will be uploaded onto OWL/and/or a GoogleDoc and displayed for practicum (10%).  
*Questions and concerns* before practicum will be addressed. |
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<td>Nov. 12 - Dec. 7</td>
<td><em><strong>Practicum</strong></em></td>
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<td>Dec. 10 - Jan. 4</td>
<td><em><strong>Vacation</strong></em></td>
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**TERM 2**

**Using Trade Books in Science**
- What role can trade books play in the development of scientific concepts?
- What issues do teachers need to think about when selecting trade books for science lessons?

**Readings:**
- Using Trade Books in Teaching Elementary Science: Facts and Fallacies: trade books can be a valuable addition to the science curriculum, if teachers know how to select good ones
  D. Rice, The Reading Teacher, 2002, 55(6), 552-565
  http://go.galegroup.com.proxy1.lib.uwo.ca/ps/retrieve.do?tabID=T002&resultListType=RESULT_LIST&searchResultsType=SingleTab&searchType=BasicSearchForm&currentPosition=1&docId=GAE%7CA84143864&docType=Article&sort=Relevance&contentSegment=&prodId=AONE&contentSet=GAE%7CA84143864&searchId=R4&userGroupName=lon
d95336&inPS=true

  - Perspectives: Children’s Literature in the Science Classroom
    S. Abell, Science and Children, Nov 08

  - Literacy in the Learning Cycle: Incorporating trade books helps plan inquiry learning experiences
    S. Everett and R. Moyer,

  - Teaching Science Through Story
    J. Horton, Teaching Science, 2013, 59(3)
    https://search-proquest-com.proxy1.lib.uwo.ca/docview/1448232569?pq-origsite=summon&accountid=15115

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**Assignment 4 DUE: Lesson Plan and Reflection**

You will report and critique a science lesson that you planned and taught during your first practicum experience. Required components and details will be discussed prior to going on practicum. (30%)

**Practicum Debrief**

Planning for the final assignment – brainstorming session as a class, group graffiti boards, information sharing etc.
**Science Notebooks**
- How can science notebooks be used to document work and demonstrate understanding?
- How can science notebooks be structured to take into consideration issues of differentiated learning and diversity?

**Readings:**
- Five Good Reasons to Use Science Notebooks
- Methods and Strategies: Science Notebooks as Learning Tools
- Science Notebooks for the 21st Century: Going Digital Provides Opportunities to Learn With Technology rather Than From Technology
  [http://go.galegroup.com.proxy1.lib.uwo.ca/ps/retrieve.do?tabID=T002&resultListType=RESULT_LIST&searchResultsType=SingleTab&searchType=BasicSearchForm&currentPosition=1&docId=GALE%7CA494891600&docType=Article&sort=Relevance&contentSegment=t&prodId=AONE&contentSet=GALE%7CA494891600&searchId=R1&userGroupName=lond95336&inPS=true](http://go.galegroup.com.proxy1.lib.uwo.ca/ps/retrieve.do?tabID=T002&resultListType=RESULT_LIST&searchResultsType=SingleTab&searchType=BasicSearchForm&currentPosition=1&docId=GALE%7CA494891600&docType=Article&sort=Relevance&contentSegment=t&prodId=AONE&contentSet=GALE%7CA494891600&searchId=R1&userGroupName=lond95336&inPS=true)
- The Art of Reviewing Science Journals
  Science and Children, Feb 2017
  D. Shepardson and S. Britsch, Science and Children, 2004, 42(3)
- More Than Data: Using Interactive Science Notebooks to Engage Students in Science and Engineering

**Environmental Education Part II**

What are some hands-on ways to integrate EE into the classroom? What is food literacy? How can food be utilized as a way to make connections among science, environment and the curriculum?
- integration of subject/cross curricular planning – particular interest will be paid to food literacy and using food as a bridge between subjects

**Resources:**
- Ted Talk – Connecting our neighbourhoods with food
  [https://www.youtube.com/watch?v=8V0jlGCh07Y](https://www.youtube.com/watch?v=8V0jlGCh07Y)
- Alice Waters Edible School Yard:
  [https://www.youtube.com/watch?v=87eSSufPsWU](https://www.youtube.com/watch?v=87eSSufPsWU)
- FoodShare Toronto website: Great big crunch [http://foodshare.net/program/crunch/](http://foodshare.net/program/crunch/) (see also the resources and activities section they have for food literacy resources.)
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<tr>
<th>Date</th>
<th>Topic</th>
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<tr>
<td>Feb. 4</td>
<td>Effective Assessment Practices in Science</td>
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<td>- What is the role of formative and summative assessment in science?</td>
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<td>- What are various effective assessment practices?</td>
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<td><strong>Readings and Resources:</strong></td>
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<td></td>
<td>- Embedding Formative Assessment into the 5E Instructional Model</td>
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<td></td>
<td>Science and Children, 2017, 55(4)</td>
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<td>P. Keeley</td>
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<td>- Seamless Assessment in Science</td>
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<td>Abell and Volkman, 2006</td>
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<td>- Everyday Assessment in the Science Classroom</td>
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<td>Atkin and Coffey, 2003</td>
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<td>Feb. 11</td>
<td>Other Ways of Knowing in Science</td>
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<td><em>FNMI Guest Speaker- TBA</em></td>
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<td>Feb. 25</td>
<td>Assignment 5 DUE: Creative Integration of Science/ Presentations</td>
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<td>This assignment will be completed in groups outside of class but will be presented to the class. It will address the need to integrate science and at least one other subject/curriculum goal. It is an assignment where you can explore and push the boundaries of what science is and how it can be viewed in the primary/junior classroom. Further details will be discussed in class. (20%)</td>
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<td>Mar. 4</td>
<td>Creative Integration of Science Presentations Continued</td>
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<td>Mar. 11</td>
<td>Topic: TBA</td>
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<td>Mar. 18-21</td>
<td><em><strong>Reading Week #2</strong></em></td>
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<td>Mar. 25-Apr. 18</td>
<td><em><strong>Practicum</strong></em></td>
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Course Materials:

There is no required textbook for this course. Articles can be found on the University’s library database or uploaded to the OWL site. All other resources, such as curriculum documents, are available online.

Assignments and Other Course Requirements:

Students will be evaluated on the following criteria

Term 1:
Assignment 1: Written reflection of an article (individual) – 15% - October 1, 2018
Assignment 2: Lesson deconstruction workshop (group, in class with individual written output) – 15% - October 29, 2018
Assignment 3: Resource sharing symposium: 10% - November 5, 2018

Term 2:
Assignment 4: Lesson Plan and reflection (individual) – 30% - January 15, 2019
Assignment 5: Creative lesson integration (group presentation) – 20% - February 25 and March 4, 2019

Ongoing:
Professionalism – 10%

Policy Statements:

Accessibility: The University of Western Ontario is committed to recognizing the dignity and independence of all students and seeks to ensure that persons with disabilities have genuine, open and unhindered access to academic services. Please contact the course instructor if you require course materials in an alternative format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for information about requesting academic accommodation, or go to the following website: http://www.edu.uwo.ca/teacher-education/docs/policies/Accessibility_Western.pdf

Attendance: The B.Ed. program is an intense and demanding programs of professional preparation. You are expected to demonstrate high levels of both academic and professional integrity. Such integrity is demonstrated in part by your commitment to and attendance at all classes, workshops, tutorials, and practicum activities. Read more about the Faculty’s attendance policy on-line at http://www.edu.uwo.ca/teacher-education/docs/Attendance%20Policy%202016.pdf.

Excused Absences: If you are ill, require compassionate leave, or must miss classes for religious observance, your absence is excused; you will not be penalized but you are responsible for work missed.

Unexcused Absences: Any absence that is not a result of illness, bereavement, or religious observance is an unexcused absence. Three unexcused absences will result in you being referred to the Associate Dean and
placed on academic probation. Any further unexcused absence will result in failure of the course and withdrawal from the program.

**Language Proficiency:** In accordance with regulations established by the Senate of the University, you must demonstrate the ability to write clearly and correctly. Work which lacks proficiency in the language of instruction is unacceptable for academic credit, and will either be failed or, at the discretion of the instructor, returned to you for revision to an acceptable level.

**Late Penalties:** Normally, the only acceptable reasons for late or missed assignments are illness (which you must report to the Teacher Education Office) or extreme compassionate circumstances. Unexcused late assignments will be penalized at a rate of $5\%$ per day, and will not be accepted more than 7 days after the due date unless prior arrangements have been made with the instructor.

**Academic Offences:** Scholastic offences are taken very seriously in this professional Faculty. You are, after all, going to be a teacher. Read about what constitutes a Scholastic Offence at the following Web site: [http://www.edu.uwo.ca/teacher-education/docs/policies/WEB_ScholasticDiscipline.pdf](http://www.edu.uwo.ca/teacher-education/docs/policies/WEB_ScholasticDiscipline.pdf)

**Plagiarism:** Plagiarism means presenting someone else’s words or ideas as your own. The concept applies to all assignments, including lesson and unit plans, laboratory reports, diagrams, and computer projects. For further information, consult your instructors, the Associate Dean’s Office, and current style manuals. Advice about plagiarism and how to avoid it can also be found here: [https://www.edu.uwo.ca/teacher-education/docs/policies/WEB_PlagiarismPolicy.pdf](https://www.edu.uwo.ca/teacher-education/docs/policies/WEB_PlagiarismPolicy.pdf)

**Plagiarism-Checking:**

- All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com ([http://www.turnitin.com](http://www.turnitin.com)).

- Computer-marked multiple-choice tests and/or exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

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**Western SUPPORT SERVICES**

**FINANCIAL ASSISTANCE:** Registrarial Services ([http://www.registrar.uwo.ca](http://www.registrar.uwo.ca))

**WRITING SUPPORT:** Student Development Centre ([http://www.sdc.uwo.ca/](http://www.sdc.uwo.ca/))

**LEARNING SKILLS SUPPORT:** Student Development Centre ([http://www.sdc.uwo.ca/](http://www.sdc.uwo.ca/))

**INTERNATIONAL STUDENTS:** Student Development Centre ([http://www.sdc.uwo.ca/](http://www.sdc.uwo.ca/))

**ABORIGINAL STUDENTS:** Student Development Centre ([http://www.sdc.uwo.ca/](http://www.sdc.uwo.ca/))

**STUDENTS with DISABILITIES:** Student Development Centre ([http://www.sdc.uwo.ca/](http://www.sdc.uwo.ca/))

**SOCIAL & CULTURAL ISSUES:** University Students’ Council ([http://westernusc.ca/services/](http://westernusc.ca/services/))

**EMOTIONAL or MENTAL DISTRESS:** [http://www.uwo.ca/uwocom/mentalhealth/](http://www.uwo.ca/uwocom/mentalhealth/)