

# Western Education

Transforming Education. Transforming Lives.

## EDUC 5178

### Curriculum & Pedagogy in Elementary Science and Technology (PJ)

#### Instructors:

**Peter Ferguson (He/Him)**

(Section 001,003,004)

**E: pfergus9@uwo.ca**

**T: 226-376-5802**

**Office Hours: by appointment**

**Dr. Isha Decoito**

Course Coordinator

**E: idecoito@uwo.ca**

#### Schedule:

**Section 001: Mon. 2:30PM.- 4:30PM.**

**Section 003: Tues. 8:30AM. -10:30AM.**

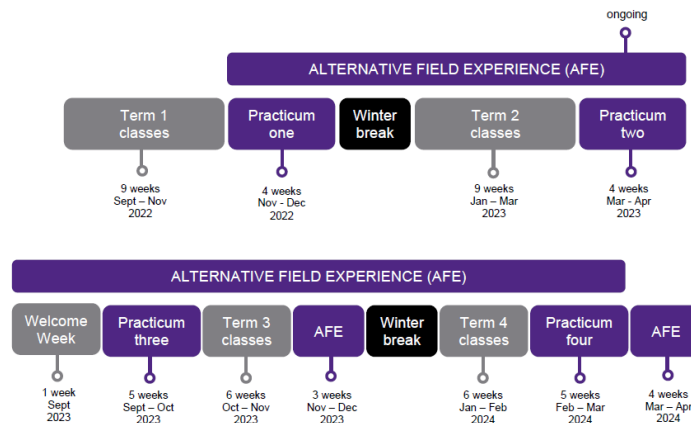
**Section 004: Tues. 10:30AM. -12:30PM.**

#### Program Context:

This is a **P/J Curriculum Course** taken by Teacher Candidates during **Year 1, Full Year** of the Bachelor of Education.

#### Bachelor of Education

Program Overview – Class of 2024



### Course Description

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 the desired educational aims, and appropriate for young learners. Significant attention is paid to environmental and sustainability education.

2 hours per week,

Full year, 0.5 credit.

Number of weeks: 18

In this course, candidates will develop an understanding of the principles underlying the teaching of science and technology in the Primary and Junior Divisions. Using a diverse form of presentations, discussions and hands-on activities, participants will develop their knowledge of the Ontario Science and Technology curriculum, understand what it means to teach in ways that are meaningful and relevant, as well as practice the skills of inquiry and technological design. Emphasis will be placed on teaching practices that link science and technology to society and the environment (STSE), and intentionally represent equity, diversity, inclusive and decolonization (EDI-D). Integral to the course is the objective to help teacher candidates develop their commitment to students and student learning, further professional knowledge through ongoing professional learning, and applying professional knowledge to professional practice in learning communities.

All resources will be posted on OWL weekly.

Number of Weeks: 18

### Week 1: Welcome; Course Overview; Curriculum Documents (Sept.6/2022)

1. How is the curriculum set up? ( Strands, Big Ideas, Overall expectations, specific expectations)
2. What is science and technology?
3. What is STSE? What are the goals for environmental education?

### Learning Activities

Type	Name	Description
Discussion/Participation	Week #1 Reading/Materials.	Ontario Ministry of Education (2022). The Ontario Curriculum Grades 1-8: Science and Technology. Toronto: Queen's Printer. The Ontario Curriculum Grades 1-8: Environmental Education (On-line) <a href="http://www.edu.gov.ca/eng/curriculum/elementary/environmental_ed_kto8_eng.pdf">http://www.edu.gov.ca/eng/curriculum/elementary/environmental_ed_kto8_eng.pdf</a> Ontario Ministry of Education (2016)The Kindergarten Program Available (On-line):

### Week 2: Scientific Literacy; Myths/Misconceptions in Science; Constructivism & the Learning Cycle (Sept. 12-13/2022)

1. What are the myths/misconceptions you have had in Science? How can a teacher's misconception shape classroom learning?
2. How does environmental education connect to the goals ,topics ( ie. Climate Change/Food Literacy) and

expectations in the Science & Technology curriculum?

3. What is constructivism?
4. How does understanding of the learning cycle help in teaching?
5. What is Scientific Literacy?

### Learning Activities

Type	Name	Description
Reading	Week #2 Reading/ Materials.	What is Constructivism ( On-line) <a href="https://www.wgu.edu/blog/what-constructivism2005.html#close">https://www.wgu.edu/blog/what-constructivism2005.html#close</a> Ontario Ministry of Education (2022). The Ontario Curriculum Grades 1-8: Science and Technology. Toronto. Queen's Press

### Assessment Activities

Type	Name (for/as learning)	Description
Formative Assessment	Identify/Connect Key Ideas/	Participation

### Week 3: Equity and Differentiation in Science and Technology; EDI-D (Equity, Diversity, Inclusion and Decolonization). (Sept.19-20/2022).

1. Why are equity and differentiation important to student learning?
2. What are the implications for the science and technology classroom?
3. How can I plan a lesson that is inclusive and reflects EDI-D?

### Learning Activities

Type	Name	Description
	Week #3 Reading/materials	Barba R., (1998). Science in the multicultural classroom. Allyn & Bacon, ISBN 0-205-26737-8; Ontario Ministry of Education (2009). Acting  Today, Shaping Tomorrow; A Policy Framework for Environmental Education in Ontario Schools ( On-line).

### Assessment Activities

Type	Name (for/as learning)	Description
Formative Assessment	Identify/Connect Key Ideas	Participation/discussion

### Week 4: Inquiry in Science Teaching: Questioning; Effective Questions; Bloom's Taxonomy.

## (Sept. 26-27/2022)

1. What are the characteristics of investigative and experimental questions?
2. How do student and teacher questions drive inquiry and support learning?
3. What is scientific inquiry and its implications for instruction in science?
4. Introduction to assignment #1 - due at the end of class #5 ( Oct 3/4,2022)  
(detailed instructions posted in OW.L)

### Learning Activities

Type	Name	Description
Reading	Week #4 Reading/Materials	Ontario Ministry of Education (  October 2011) Special Edition #24. Getting Started with Student Inquiry (On-line). Ontario Ministry of Education 9 May 2013). Special Edition #32. Inquiry-based Learning (On-line)

### Assessment Activities

Type	Name	Description
Formative Assessment	(for/as learning), Identify/Connect Key Ideas	Participation/discussion

## Week 5: Inquiry and Questioning continued: Transformative Learning

### (Oct.3-4/2022)

1. What is the Head, Heart, and Hands model of transformative learning?
2. Class time to work on assignment #1 which is due at the end of this class.( Detailed instructions will be posted in OWL in week #4).

### Learning Activities

Type	Name	Description
Reading	Week # 5 Reading	Head, heart, and hands model for transformative learning: Place as a context for changing sustainability values (Singleton 2015) Assignment #1 posted in OWL

### Assessment Activities

Type	Name	Description
Formative Assessment	Identify/Connect Key Ideas)	Participation
Summative Assessment	Lesson Deconstruction assignment	

## Week 6: Assessment Part 1: Growing Success; Differentiated and Integrated Science Planning; Universal Design (Oct.17-18/2022)

1. How can I plan a lesson that addresses the needs of a variety of learners?
2. Growing Success Document: Goals, Assessment for ,as, of learning.
3. Variety of learners: learning styles, ELL, Cultural Inclusions, First Nations.

### Learning Activities

Type	Name	Description
Reading	Week # 6 Reading/ materials	O.M.E (2010). Growing Success. Assessment, Evaluation and reporting in Ontario Schools. ( On-line) O.M.E. (2016) Growing Success The Kindergarten Addendum. Assessment, Evaluation and Reporting in Ontario Schools ( On-line)

### Assessment Activities

Type	Name	Description
Formative Assessment	(for/as learning) Identify/Connect Key Ideas	Participation

## Week 7: Technological Integration; Issues using technology in the classroom. (Oct.24-25/2022)

1. What are the benefits and disadvantages of using technology in the classroom?
2. How do we address issues using technology in the classroom?
3. How can technology be effectively integrated into science lessons?

### Learning Activities

Type	Name	Description
Reading	Week # 7 Reading	TBD

### Assessment Activities

Type	Name	Description
Formative Assessment	(for/as learning) Identify/Connect Key Ideas	Participation

## Week 8: Lesson Planning; Lesson Deconstruction Assignment (Oct.31-Nov.1/2022)

1. Video: 5E lesson model.
2. Design Thinking: how can we apply design thinking to our classrooms?
3. Work on Lesson Deconstruction Assignment.

## Learning Activities

Type	Name	Description
Reading	Week #8 Reading/materials	An Introduction to Design Thinking Process Guide - <a href="http://web.stanford.edu/~mshanks/MichaelShanks/files509554.pdf">http://web.stanford.edu/~mshanks/MichaelShanks/files509554.pdf</a> Assignment #2 posted in OWL

## Assessment Activities

Type	Name	Description
Formative Assessment	Identify/Connect Key Ideas	Participation

## Week 9: Lesson Planning: Lesson Deconstruction; Mid-Year Reflections

(Nov.7-8 /2022)

1. Class time used to work on/complete lesson deconstruction assignment #2 due at end of this class..
2. Mid-term reflections discussion ( stop/start/continue discussion)

## Learning Activities

Type	Name	Description
Reading		

## Assessment Activities

Type	Name	Description
Formative Assessment	Discussion of Key Ideas- Lesson	Participation
Summative Assessment	Deconstruction assignment.	

## Week 10:Resource Sharing Symposium; Lesson Deconstruction Presentations

(Jan.2-3/2023)

- . 1.You will bring the lesson deconstruction assignment to present to the class ( Resources will be shared in OWL).

## Learning Activities

Type	Name	Description
Reading		

## Assessment Activities

Type	Name	Description
Summative Assessment		Presentations/discussions

## Week 11:Cross-Curricular Activity; STEM Integration; Coding in grades 1-6.

(Jan. 9-10/2023)

1. Guest Speaker- Samantha Fowler Western University Engineering Dept. Outreach programs.
2. What are the benefits of teaching coding in grades 1-6?
3. What is STEM and what does it look like in grades jk-6 classrooms?

## Learning Activities

Type	Name	Description
Reading		

## Assessment Activities

Type	Name	Description
Formative	Identify/Connect	
Assessment	Key Ideas.	Hands-on Participation

## Week 12: Other ways of knowing in Science - Focus on FNMI perspectives

(Jan.16-17 /2023).

1. Guest speaker from an Indigenous perspective.
- 2.. How can Indigenous Science and Technology instruction?
- 3.. What is the difference between Western science and Indigenous knowledge?

## Learning Activities

Type	Name	Description
Reading	Week #12 Reading	Ontario Ministry of Education (September 2011). Research Monograph #36. Teaching for Ecological Sustainability: Incorporating Indigenous Philosophies and Practices. (On-line).

## Assessment Activities

Formative assessment	Identify/Connect Key ideas	Participation
----------------------	-------------------------------	---------------

## Week 13: Assessment Part 2 (Jan.23-24/ 2023)

1. What are various effective assessment practices and tools?
2. How can I use a variety of assessments throughout a unit so that students have multiple and varied opportunities to show what they know and can do?

## Learning Activities

Type	Name	Description
Reading	Week # 13 Reading	O.M.E. Growing Success document (2010) The differentiated instruction scrapbook (O.M.E. 2010).

## Assessment Activities

Type	Name	Description
------	------	-------------

Formative Identify/Connect Participation  
Assessment Key Ideas

---

### Week 14: Safety In Science: Experimental Design (Jan. 30-31/2023)

- 1, How do we keep science classrooms safe?
2. How do we design experiments in the elementary classroom? Makerspaces/Outdoor and experiential learning.
3. How do we address safety in the P/J Science class?

#### Learning Activities

Type	Name	Description
Reading	Week #14 Reading	TBD

---

#### Assessment Activities

Type	Name	Description
Assignment Formative	(for/as learning) Identify/Connect Key Ideas	Participation

---

### Week 15: Research and Development: Learning Centres (Feb. 6-7/ 2023)

1. Introduction to assignment #3 - Research and Development - Learning Centres.
2. Working on Learning Centres.

#### Learning Activities

Type	Name	Description
Reading	Week #15	

---

#### Assessment Activities

Type	Name	Description
Assignment	Due Wk/1718: Assignment #3	Details(Specifics in OWL)

---

### Week 16: Research and Development: Learning Centres ( Con't). (Feb 13-14/ 2023).

1. Working on Learning Centres assignment.

#### Learning Activities

Type	Name	Description
Reading	Week # Reading	Reading citation/links

---

#### Assessment Activities

Type	Name	Description
Summative Assessment: Assignment #3 is due on weeks 17/18,2023.		



## Week 17: Learning Centres; Presentations (Feb.27-28 / 2023)

1. Working on Learning Centres
2. Presentations of Learning Centres

### Learning Activities

Type	Name	Description
Reading		

### Assessment Activities

Type	Name	Description
Assignment	Due Wk # 17/18: Assignment 3	Details Overview and Rubrics(Specifics in OWL)

## Week 18: Research and Development: Learning Centres Presentations

### (March 6-7 /2023)

1. Learning Centres presentations
2. Course evaluation
3. End of year celebration
4. All presentations will be shared in OWL

### Assessment Activities

Type	Name	Description
Assignment #1 Due week #5 (Oct.3/4,2022) Inquiry/asking inquiry type questions assignment.		Teacher candidates will choose a mind map from the online and come up with ten inquiry type of questions based ten on Bloom's Taxonomy. Reflect EDI-D and STSE in the questioning activity. Detailed instructions will be posted in OWL. This will be an in class assignment that teacher candidates are not expected to use outside of class time to complete.
Assignment #2 Due week 9 (Nov.7/8.2022) Lesson Deconstruction assignment.		In this assignment, teacher candidates will analyze and modify (if necessary) one science lesson plan or activity appropriate for your practicum grade level involving the development of science and technology skills. You will critically look at an existing lesson/activity considering aspects of inquiry, differentiated instruction, constructivism,, EDI-D, and curricular integration. Detailed instructions will be posted in OWL
Assignment #3 Due week 17/18 (Feb 27/28 or March 6/7,2023) Learning Centres in P/J Science and Technology		In groups of 4 or less, teacher candidates will develop a series of activities addressing a specific curriculum topic which will be organized into a learning centre format for a P/J Science and Technology class. The learning centre must address aspects of the following: a) different learning styles b) cross disciplinary/integrated approaches c) principles of EDI-D, inquiry-based learning and technology integration.  Details will be provided inn OWL.
Assignment - Professionalism & Participation		- Consistently demonstrates respect and integrity, and professionalism.

## This course meets the following Competencies:

Course Objective 1: Teacher candidates demonstrate knowledge of the Science & Technology subject matter, and an awareness of how their work is governed by the Ontario curriculum, and education related legislation.

Course Objective 2: Teacher candidates develop an understanding of how to develop an environment for learning that encourages pupils to be problem solvers, decision makers, lifelong learners and contributing members of a changing society.

Course Objective 3: Teacher candidates demonstrate an understanding of why it is so important to treat all students equitably and with respect.

Course Objective 4: Teacher candidates use learning and teaching theories and methods and differentiated instruction.

## How to Protect Your Professional Integrity:

The Bachelor of Education is an intense and demanding program of professional preparation. Teacher Candidates are expected to demonstrate high levels of academic commitment and professional integrity that align with both Western University's Academic Rights and Responsibilities and the Professional Standards and Ethical Standards set by the Ontario College of Teachers. These expectations govern your time in class, in your Practicum, in your Alternative Field Experiences, and include the appropriate use of technology and social media.

The Teacher Education Office will only recommend teacher candidates for Ontario College of Teachers certification when candidates have demonstrated the knowledge of, and adherence to, the faculty policies throughout the two-year program.

To review the policies and practices that govern the Teacher Education program, including attendance, plagiarism, progression requirements, safe campus and more, visit:  
[edu.uwo.ca/CSW/my-program/BEd/policies.html](http://edu.uwo.ca/CSW/my-program/BEd/policies.html)

## Faculty of Education Pass/Fail Policy:

All courses and assignments in the Bachelor of Education are assessed as Pass/Fail.

Instructors will make the Success Criteria of the assignments clear, and refinements of the criteria may take place in class as a means of co-constructing details of the assignments in the first two weeks of a course. This will allow for differentiation of process, product and timeline depending upon student needs.

Success Criteria will

- Articulate what needs to occur to demonstrate learning outcomes for a course/assignment;
- Inform the instructional process so that teaching can be adapted to ensure students continue to remain on track to meet the criteria as needed and appropriate.
- Align with the assignments created to provide opportunities for students to demonstrate the knowledge, skills and abilities they are working toward;
- Establish clear descriptive language that allows Teacher Candidates to identify, clarify and apply the criteria to their work and to their engagement in peer feedback;

- Focus the feedback on progress toward meeting the overall and specific tasks/assignment goals for the course.

## Participation

Participation is essential to success in the Teacher Education program. As a professional school, you need to treat coming to class as showing up for work in the profession. If you are not in class, you cannot participate. Actively participating in discussions, peer reviews/feedback, group work and activities is integral to the development of your own learning and to the learning within your classroom community.

Given the varied experiences of Teacher Candidates in the program, you may engage with ideas/concepts or skills that are familiar or unfamiliar to you.

A Professional Teacher Candidate is one who:

- Arrives in class (virtual or on-site) on time, and prepared. This includes completing any readings, viewing assignments or tasks in advance of class as requested.
- Listens to others and contributes thoughtfully to discussions;
- Models respectful dialogue and openness to learn, monitors, self-assesses and reformulates one's prior beliefs and understandings in light of new information;
- Monitors and addresses their wellness, practices self-care, and seeks appropriate support when necessary.

## Ontario Curriculum & Supplementary Resources:



**Curriculum & Resources**

[dcp.edu.gov.on.ca/en](http://dcp.edu.gov.on.ca/en)

## Campus Services & Resources:



**Health and Wellness**

[uwo.ca/health](http://uwo.ca/health)



**Peer Support**

[westernusc.ca](http://westernusc.ca)



**Learning Skills**

[uwo.ca/sdc/learning](http://uwo.ca/sdc/learning)



**Indigenous Services**

[Indigenous.uwo.ca](http://Indigenous.uwo.ca)



**Student Accessibility Services**

[sdc/uwo.ca/ssd](http://sdc/uwo.ca/ssd)



**Writing Support**

[writing.uwo.ca](http://writing.uwo.ca)



**Financial Assistance**

[registrar.uwo.ca](http://registrar.uwo.ca)



**Not sure who to ask?**

Contact the Teacher Education Office at [eduwo@uwo.ca](mailto:eduwo@uwo.ca)