

EDUC 5205 & 5221

Curriculum & Pedagogy in Senior Chemistry & Senior Physics

Instructor:

Inna Ellacott

E: inna.ellacott@uwo.ca

Office Hours: by appointment

Dr. Isha Decoito

Course Coordinator

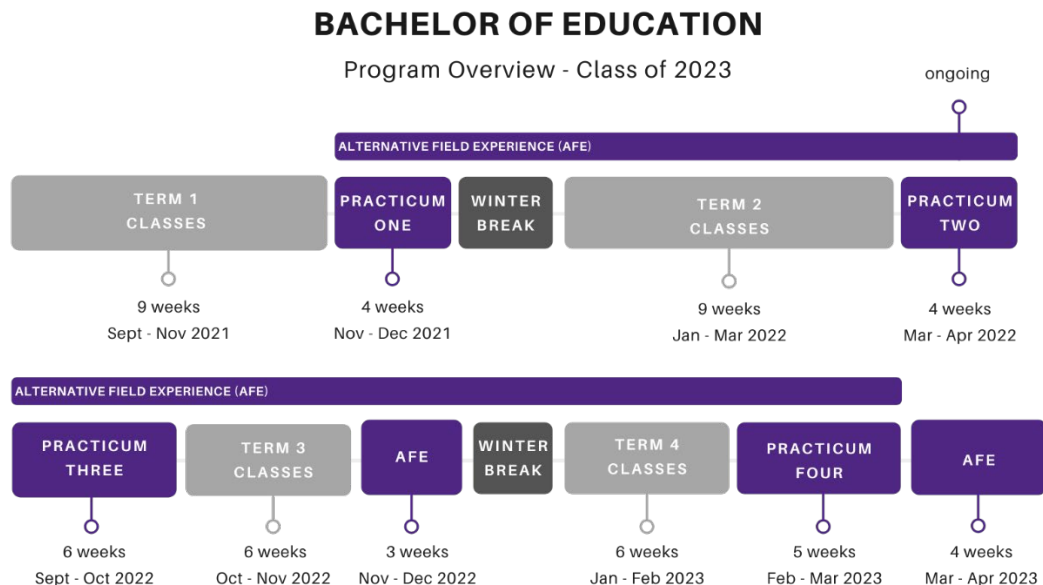
E: idecoito@uwo.ca

Schedule:

Section 001: Tues/Thur 4:30PM-6:30PM,
Room: 2036

Program Context:

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



Curriculum & Pedagogy in Senior Chemistry & Senior Physics (EDUC 5205-5221)

EDUC 5205: An introduction to curriculum and instruction in chemistry in the Intermediate-Senior divisions. Students design and critique instructional approaches based on a consideration of the nature of science and science education. Attention to constructivist, cognitive, behavioural and social theories of learning, and to motivation, student diversity and classroom management.

EDUC 5221: A critical introduction to curricula and pedagogy in science with particular emphasis on Physics. A focus on pedagogical practice and on the theoretical perspectives in science, learning, instruction, and society which can guide that practice. An explicitly developmental approach requiring teachers to assume responsibility for their own professional growth. 4 hours per week, full year, 1.0 credit

The course will focus on Ontario grade 11 and 12 chemistry and physics teaching methods and the themes and issues in science education. Topics addressed, but not limited to, will include: the Ontario Science Curriculum, the nature of learning and teaching in science, science teaching strategies and classroom management, assessment and evaluation, inquiry in science education, STSE, planning and time management, inclusiveness and equity, numeracy and literacy in science, 21st Century teaching and learning, inclusiveness and equity, and democratic and holistic education.

There is no required textbook for this course.

All readings and a tentative course schedule will be posted on OWL.

Number of Credits : 1

Number of Weeks: 18

Week 1: The Ontario Senior Science Curriculum

- Introduction
- Course Overview
- Discovering Ontario Senior Science Curriculum

Learning Activities

Type	Name	Description
Discussion	Week 1 Discussion	Class participation, discussions, and ad-hoc reflection exercises.
Reading	Week 1 Readings	The Ontario Senior Science Curriculum http://www.edu.gov.on.ca/eng/curriculum/secondary/2009science11_12.pdf

Week 2: Ontario Chemistry/Physics Curriculum

- Exploring chemistry/physics Ontario curriculum courses (pre-requisites and electives), units, chapters and topics.
- Curriculum resources and materials available to physics and chemistry teachers.
- Learning Cycle

Learning Activities

Type	Name	Description
Discussion	Week 2 Discussion	Class participation Starting the Curriculum Teacher's Package
	Week 2 Readings	The Ontario Senior Science Framework https://youthsciencecanada-my.sharepoint.com/personal/dominic_tremblay_youthscience_ca/_layouts/originalPath=aHR0cHM6Ly95b3V0aHNjaWVuY2VjYW5hZGZGEtbXkuc2hpcmVwb2ludC5jb20vOmY6L2 Examining the Learning Cycle https://www.sciencefromscientists.org/wp-content/uploads/2017/06/brownandabellelearningcycle.pdf

Week 3: Curriculum and Pedagogy: Nature of Science Education

- Learning Cycle in science
- Characteristics of the nature of science
- How do adolescents learn chemistry and physics?

Learning Activities

Type	Name	Description
Discussion	Week 3 Discussion	Class participation, discussions, and ad-hoc reflection exercises
		Learning cycle and didactic teaching
		Interpreting Ministry Expectations
Reading	Week 3 Readings	Nature of science
		Continuing the Curriculum Teacher's Package
		NOS in Physics/science class https://iopscience.iop.org/article/10.1088/0031-9120/51/5/055001/meta

Week 4: Curriculum and Pedagogy: Science Learning Cycle

- 5E Learning Cycle in physics/chemistry
- Physics/chemistry curriculum planning strategies

Learning Activities

Type	Name	Description
Discussion	Week 4 Discussion	Discussion of reading materials
		Planning Exercise
Reading	Week 4 Readings	Class participation, discussions, and ad-hoc reflection exercises.
		A Learning Cycle http://people.uncw.edu/kubaskod/sec_406_506/classes/class_6_planning/learning_cycle.pdf

Week 5: Long term, Short Term planning and Time Management

- Creating Semester Outline
- Creating Unit Plan for Physics/Chemistry Unit

Learning Activities

Type	Name	Description
		Work in class using provided Semester and Unit Plan templates
		Week Readings discussion
Discussion	Week 5 Discussion	Class participation, discussions, and ad-hoc reflection exercises.
		Curriculum Teacher's Package due
Reading	Week 5 Readings	New Teachers: Lesson and Curriculum Planning https://www.edutopia.org/article/new-teachers-lesson-curriculum-planning-resources

Week 6: Lesson Planning

- Creating a lesson plan for physics/chemistry class
- Lesson plan templates
- 5E Lesson Plan for physics/chemistry
- Teachers' Resources on Lesson Planning

Learning Activities		
Type	Name	Description
		Completing the long-term planning exercise
		Lesson planning ideas
Discussion	Week 6 Discussion	Week Readings discussion
		Class participation, discussions, and ad-hoc reflection exercises.
Reading	Week 6 Readings	Teachnology Lesson Plans http://www.teach-nology.com/teachers/lesson_plans/science/912/
		Share my Lesson https://sharemylesson.com/

Week 7: Introduction to Assessment and Evaluation Policies

- Ontario Ministry of Education Assessment and Evaluation Policies
- Assessment categories in Physics and Chemistry classroom (KICA)

Learning Activities		
Type	Name	Description
		Class participation, discussions, and ad-hoc reflection exercises.
		Advantages of Traditional or Conventional Evaluation
Discussion	Week 7 Discussion	Classroom Assessment
		Seven Keys to Effective Feedback
		Assessment categories
		Semester/Unit/Lesson Plan due

Learning Activities

Type	Name	Description
Reading	Week 7 Readings	Growing Success http://www.edu.gov.on.ca/eng/policyfunding/growSuccess.pdf

Week 8: Feedback and Reporting

- Effective, inclusive communication and feedback
- Provincial Report Cards, Chemistry/Physics reporting
- Special Considerations

Learning Activities

Type	Name	Description
Discussion	Week 8 Discussion	Class participation, discussions of reading materials, and ad-hoc reflection exercises.
Reading	Week 8 Readings	Reporting Students Learning http://www.edugains.ca/resourcesAER/PrintandOtherResources/ReportingStudentLearning_Engfinal .

Week 9: Science, Technology, Society and Environment

- Implementing socio-scientific issues in the science classroom
- Connecting curriculum to real-world issues
- Pedagogical strategies for STSE lessons

Learning Activities

Type	Name	Description
Discussion	Week 9 Discussion	Class participation, discussions of reading materials, and ad-hoc reflection exercises.
		Environmental/Sustainability
		Issues in science education
Reading	Week 9 Readings	Dilemmas and Controversies in Science
		KICA Workbook and Reflection due
		Teaching for Ecological Sustainability http://www.edu.gov.on.ca/eng/literacynumeracy/inspire/research/WW_Teaching_Ecological.pdf

Week 10: Welcome Back! Introduction to Science Classroom Management

- Fundamental Principles of classroom management in a science lab setting
- Diversity of the learning styles and needs in Chemistry/Physics.

Learning Activities

Type	Name	Description
Discussion	Week 10 Discussion	Practicum experiences and reflection: Intervention and Support
		Communication and follow up
		Case studies

Learning Activities

Type	Name	Description
Reading	Week 10 Readings	Survive and Thrive https://survivethrive.on.ca/article-category/teaching-and-learning/
		Progressive Discipline http://edu.gov.on.ca/eng/safeschools/Discipline.pdf
		Classroom Management Tips https://www.edutopia.org/blog/classroom-management-tips-novice-teachers-rebecca-alber
		For New Science Teachers https://fornewscienceteachers.blogspot.com/2015/09/managing-science-classroom-3-is-and.html

Week 11: Professional Development Presentations

- Teacher candidates present their assignment "Professional Development"

Learning Activities

Type	Name	Description
Discussion	Week 11 Discussion	Class participation, discussions of reading materials, and ad-hoc reflection exercises.

Week 12: Science Classroom Management: Diverse Learners in Chemistry/Physics Classroom

- What is Inter-cultural inquiry?
- Teaching students with IEP
- Diverse learners in chemistry/physics classroom

Learning Activities

Type	Name	Description
Discussion	Week 12 Discussion	Class participation, discussions of reading materials, and ad-hoc reflection exercises.
		Culturally Responsive Pedagogy http://www.edu.gov.on.ca/eng/literacynumeracy/inspire/research/CBS_ResponsivePedagogy.pdf
Reading	Week 12 Readings	Ontario First Nation, Métis, and Inuit Education Policy Framework http://www.edu.gov.on.ca/eng/aboriginal/fnmiFramework.pdf
		Caring and Safe Schools in Ontario http://www.edu.gov.on.ca/eng/general/elemsec/speced/Caring_Safe_School.pdf

Week 13: Inquiry learning

- Many Levels of Inquiry
- Guiding questions
- Designing Inquiry Lessons

Learning Activities

Type	Name	Description
		Inquiry exercises
Discussion	Week 13 Discussion	Designing an Inquiry Lesson Class participation, discussions of reading materials, and ad-hoc reflection exercises.
Reading	Week 13 Readings	Inquiry based Learning http://www.edu.gov.on.ca/eng/literacynumeracy/inspire/research/CBS_InquiryBased.pdf

Week 14: Inquiry Teaching

- Why engage in teacher inquiry?
- Characteristics of teacher inquiry

Learning Activities

Type	Name	Description
		Inquiry teaching case analysis.
Discussion	Week 14 Discussion	Class participation, discussions of reading materials, and ad-hoc reflection exercises.
Reading	Week 14 Readings	Collaborative Teacher Inquiry http://www.edu.gov.on.ca/eng/literacynumeracy/inspire/research/CBS_Collaborative_Teacher_Inquiry

Week 15: Technology Incorporation in Chemistry/Physics Classroom

- Global Competencies (knowledge, skills, attitudes/values)
- Promotion of critical thinking, collaboration and creativity through teaching and assessment practices
- 21st Century teaching and learning beyond textbooks: essential technology in science classroom
- Overview of digital learning tools resources (3D, immersive, interactive, etc.)

Learning Activities

Type	Name	Description
		Participating in class discussion and review of reading materials.
Discussion	Week 15 Discussion	Sharing own academic experiences related to the use of technology in the classroom. Exercises in coding for science classroom (parabolic projectile)
Reading	Week 15 Readings	21 Century Teacher https://www.edutopia.org/discussion/15-characteristics-21st-century-teacher?utm_content=community&utm_campaign=what-being-21-century-teacher-means&utm_source=facebook&utm_medium=socialflow&utm_term=link 21st Century Competencies http://www.edugains.ca/resources21CL/About21stCentury/21CL_21stCenturyCompetencies.pdf

Week 16: Democratic and Holistic Education

- Creating and planning an enriching senior learning community
- Teaching subjects as cross-curricular concepts
- Incorporating student input, choice and methods of learning

Learning Activities

Type	Name	Description
		Class participation, discussions of reading materials, and ad-hoc reflection exercises.
Discussion	Week 16 Discussion	Democratic Learning Holistic Education
Reading	Week 16 Readings	Democratic Learning https://eudec.org/democratic-education/what-is-democratic-education/ Holistic Education https://www.educationcorner.com/holistic-education.html

Week 17: Technology in the Chemistry/Physics Classroom presentations

- Using multimedia technology for learning, teaching and assessment.

Learning Activities

Type	Name	Description
Discussion	Week 17 Discussion	Technology in the Chemistry/Physics Classroom presentations

Week 18: Senior Science Professional Development Sessions & Conclusion

- The future of science education
- Life Long Learning and Professional Development

Learning Activities

Type	Name	Description
Discussion	Week 18 Discussion	Class participation, discussions of reading materials, and ad-hoc reflection exercises. Written Cumulative/Final Reflection due
Reading	Week 18 Readings	Principles and big ideas of science education https://www.interacademies.org/sites/default/files/publication/principles-and-big-ideas-of-science-education.pdf

Assessment Activities

Type	Name	Description
		Please study the Ontario Science Curriculum In your subject, either Chemistry or Physics. Prepare a 2-parts document: Part 1 - Grade 11 University Preparation course and Part 2 - Grade 12 University Preparation course.
Assignment	Due Wk 05: Curriculum Teacher's Package	For each of five strands in each course describe one inquiry activity, one laboratory activity and one assessment to address the title of the strand. You may utilize and summarize the activities found in the respective textbooks, currently approved by the school boards in Ontario. Organize your package well: use clear titles and subtitles, point format when justified, step-by-step instructions, reasonable amount of illustrative material. Consider dedicating one page to each strand - the package will contain 10 pages in total.

Assessment Activities

Type	Name	Description
Assignment	Due Wk 07: Semester/Unit/Lesson Plan	Select one course, grade 11 or 12, from the Ontario Science curriculum document in your respective subject and prepare a document containing:
		Semester (long term) plan – 5 Units Unit plan – 16 lessons Lesson plan – 75 min
		The format and templates for the long- and short-term planning will be reviewed in class in great detail.
Assignment	Due Wk 09: KICA Workbook and Reflection Due	As the group of four, create a KICA (Knowledge, Inquiry, Communication, Application) workbook for an assigned curriculum unit in grade 11 or 12 chemistry or physics. Your KICA Workbook will begin with a unit plan overview that includes:
		- 16 lesson titles, - one overall expectation that each lesson addresses - an indication of which KICA category each lesson will focus on the type of assessment included in each lesson.
		Each group member will select a lesson for one of four categories and create a full lesson plan. Each KICA category must be represented in the assignment.
		In the end, collectively write a one-page reflection on advantages and disadvantages, on your opinion, of KICA evaluation approach.
Assignment	Due Wk 11: Science Teacher Professional Development	Participate independently in a science teacher professional development activity. Some examples of professional development activities:
		a) attending Science Teachers Association of Ontario conference online b) participating in a laboratory safety workshop c) attending a science lesson demonstration d) working with an associate teacher on developing a lesson/unit or a classroom activity. e) visiting a science related destination of the potential field trip determined by you. f) participating in a science related workshop or webinar.
		Using a presentation graphic software of your choice (PowerPoint, Prezi...) prepare a 10-minute presentation to share your experience with your peers in our classroom. Report on your activity describing it, how you benefited from the participation and possible ways to incorporate the activity or what you learned from it into your science teaching repertoire.
Assignment	Due Wk 17: Technology Incorporation in Science Classroom	This assignment will be completed with a partner.
		The current state of technology utilization in the science classroom will be thoroughly discussed in class. You will be presented with a list of various software products that may be utilized in the senior chemistry/physics teaching and learning process. Please select one product from the list or propose a software of your own choice and prepare a 15 min fragment of the "lesson" that would instruct our classroom on potential utilization of these products in the teaching process. Your presentation must contain indication of connection to the curriculum and a demonstration of one complete activity for a chosen application.
Assignment	Due Wk 18: Final Reflection	Write a 500-700 words reflection on your experience as a science student in the past and how this experience would inform your future teaching practices. What kind of an educator would you like to become?

Assessment Activities

Type	Name	Description
Assignment	Ongoing: Class participation, discussions and ad-hoc reflection exercises.	Professionalism includes how well each candidate contributes to the learning of others. Candidates are expected to demonstrate participation through diligent preparation, critical analysis, and thoughtful commentary on the material being discussed in each class. Periodically reflections based on class concepts/discussions may be due during or following a class.

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/BEEd/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 online) 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.

Support Services & Resources:



Health and Wellness
uwo.ca/health



Peer Support
westernusc.ca



Learning Skills
uwo.ca/sdc/learning



Indigenous Services
Indigenous.uwo.ca



Student Accessibility Services
sdc/uwo.ca/ssd



Writing Support
writing.uwo.ca



Financial Assistance
registrar.uwo.ca



Not sure who to ask?
Contact the Teacher Education Office at eduwo@uwo.ca