Faculty of Education
The University of Western Ontario
B.Ed Course Outline

Curriculum and Pedagogy in
Intermediate/Senior Biology EDUC 5202
Intermediate/Senior Chemistry EDUC 5205
Intermediate/Senior Physics EDUC 5221
Section 001
Fall/Winter 2017/18
Monday/Wednesday: 12:30pm-2:30pm
Room 2051

Instructor: Dr. Anton Puvirajah
Office: FEB 1030
Office Hours: By Appointment
Tel: 519-661-2111 X 88664
E-mail for course: apuvira@uwo.ca

Calendar Copy
The course is an introduction to curriculum and pedagogy in the three major high school science courses. A focus on pedagogical practice and theoretical perspectives on science teaching, the nature of science, and cognitive, behavioural and social theories of science learning, and adolescent development. Ontario secondary science curricula are also examined.

Learning Outcomes
At the conclusion of the course, students will have:

• Begun their ongoing development as professional science teachers;
• Developed a professional appreciation of the big ideas and important issues in science education;
• Begun to develop their pedagogical content knowledge such as skills in creating, preparing and/or using appropriate:
  o Teaching plans;
  o Teaching strategies;
  o Teaching resources;
  o Assessment practices and;
  o Classroom management techniques.
Course Content
The course will focus on Ontario grade 11 and 12 biology, chemistry, and physics teaching methods, general themes and issues of concern in science education. It will include a variety of topics including, but not limited to, the following examples:

- The nature of teaching and learning in science
- Planning and time management
- Classroom and student management
- Assessment and evaluation
- The Ontario Science Curriculum
- 21st Century teaching and learning
- Teaching strategies
- Inquiry in science education
- The nature of science
- Gender and ‘race’
- Science for all/Scientific literacy
- Democratic and holistic education

Course Materials
There is no required textbook for this course. All readings will be posted on OWL. When required, please complete your readings before coming to class.

Course Assignments and other Requirements
Unless otherwise stated, all assignments must be submitted electronically through OWL.

Grading Summary
1. Professionalism 10%
2. My Science Classroom 5%
3. Commentary on Case Studies and Science Ed Articles 20%
4. 5E Lesson Plan 15%
5. Science Teacher Professional Development 5%
6. KICA Workbook 20%
7. Sustainability/Environmental Stewardship 5%
8. Indigenous Knowledge in Science 5%
9. Technology Incorporation in Science 5%
10. KICA Reflection 5%
11. Summative/Cumulative Reflection 5%
Total 100%

1. Professionalism – 10% (Individual) Due: Ongoing
Professionalism includes how well each candidate contributes to the learning of others. Candidates are expected to demonstrate participation through careful preparation, critical analysis, and thoughtful commentary on the material being discussed in each class. Each individual bears the responsibility of making a significant contribution to the learning of others. Success in this component of the course will also reflect appropriate attendance and punctuality.

To successfully demonstrate active participation in the course you should:
- Demonstrate regular attendance and punctuality
- Notify the instructor of absences
• Help maintain a positive learning environment in the classroom
• Listen attentively and with courtesy to presentations and discussions
• Collaborate with colleagues
• Pose questions and share comments during large and small group activities
• Provide leadership
• Demonstrate professional behavior and conduct

2. **My Science Classroom – Online Forum – 5% (Individual) Due: Sep 13 (original posting), Sep 20 (comment/feedback)**

Please post on OWL a 1.5 to 2-page discussion on how you envision your science classroom and your teaching practice. As you discuss your science classroom and teaching practice, try to explain ‘why’ you envision your classroom and teaching practice such a way.

If you wish, you may consider a few or many the following in your discussion:

a) Type of learning and teaching that would take place,
b) The type of experiences students will have in learning science,
c) Your goal for your students,
d) How you will interact with students and parents,
e) How you would go about assessing your teaching and student learning,
f) What would be the biggest take-away message for the students from their experiences in science classroom?

In addition to posting your discussion, please read your peers’ postings and provide substantive comment or feedback on two of your peers’ original postings.

3. **Commentary on Case Studies and Science Education Articles – 4 X 5% = 20% (Individual) Due: Oct 4, Nov 8, Jan 10, Feb 12**

You will be presented with four case studies or scenarios within the science teaching context and four science education articles. Your assignment is to write a 1.5 to 2-page commentary for each case study and science education article that you choose. In your commentaries, it is important to present well thought-out ideas and critiques in relation to the issues raised in the case study/article. It is encouraged that you incorporate concepts covered in this class and in other classes into your commentary. Each case study and article will be accompanied by some prompts or musings to help you with writing your commentary. However, you are not required to base your commentary on the prompts/musings.

A total of four commentaries, staggered throughout the duration of the course, are required. Two commentaries must be submitted before the end of the Fall semester, and the remaining two commentaries are to be submitted before the end of Winter semester. Of the four commentaries that you will complete, two must be from case studies and the other two from the science education articles.

4. **5E Lesson Plan – 15% (Group 3/4) Due: Oct 30 – Nov 13**

You are required to plan, develop, and teach a senior (grade 11 or 12) level science lesson to your peers in class. The science lesson should be in the 5E format and you will be graded on the lesson that you developed to teach (2.5%), your teaching (5%), and modification you made to the 5E lesson after receiving feedback from your peers and instructor (2.5%). Additionally, you are required to reflect on your teaching presentation (individual, about 1.5 pages) (5%).

5. **Science Teacher Professional Development – 5% (Individual) Due: February 28**

Before the end of the course participate in a science teacher professional development activity and provide a 1.5 to 2-page report on your activity describing the nature of the activity, how you benefitted from the the participation, and possible ways to incorporate the activity or what you learned from the activity into your science teaching repertoire. Along with your report, you will need to provide documentary evidence of your participation in the activity. Please keep in mind that the professional development activity needs focus on science teaching/learning.
Some examples of professional development activities:

   a) Attending Science Teachers Association of Ontario conference (Nov 9 – 11)
   b) Participating in a laboratory safety workshop
   c) Attending a science lesson demonstration
   d) Working with an associate teacher or some other teacher professional on developing a lesson/unit.
   e) Conducting preliminary visit of science related field trip destination
   f) Participating in a science related course or workshop

6. KICA (Knowledge, Inquiry, Communication, Application) Unit Workbook – 20% (Group 3/4) Due: Feb 14 (workbook) & Feb 21 – Mar 5 (teaching presentation)
Each group will be asked to create a KICA workbook for an assigned curriculum unit in grade 11 or 12 biology, chemistry or physics. One member of the group will be chosen by the group to pass the workbook in electronically through OWL. Each KICA Workbook will include:

- A unit plan overview, using a template that includes:
  - 20 lessons of 75 minutes duration;
  - one overall expectation that each lesson will address;
  - a one-sentence description of each lesson;
  - an indication of which KICA category each lesson will focus on;
  - an indication of the type of assessment included in each lesson;
  - 5%.

- Each individual in the group will create and develop a detailed lesson from the unit using an acceptable lesson plan format according to the following stipulations;
  - Each of the detailed lessons will have a different KICA focus;
  - Each of the detailed lessons will include an activity;
  - Each of the detailed lessons must be prepared by one member of the group (be sure to put your individual name on your lesson plan in the Workbook);
  - Each lesson will be put into the workbook;
  - Each lesson must have a detailed assessment component;
  - 10%.

- The “I” lesson will be presented to the class by the group.
  - The lesson will contain all the elements of a scientific inquiry.
  - The group will prepare all necessary equipment and materials ahead of time;
  - The group will facilitate the class in performing the investigation and;
  - At the conclusion of the class, all equipment and materials must be put away and/or safely disposed of;
  - 5%

The group will be evaluated on the merits of their presentation of this inquiry lesson.

7. Sustainability/Environmental Stewardship – 5% (Group 3/4) Due: Feb 21

8. Indigenous Knowledge in Science – 5% (Group 3/4) Due: Feb 26

9. Technology Incorporation in Science – 5% (Group 3/4) Due: Feb 28
For each of the above three, you are required to write a 2 to 3 page narrative on how you would incorporate each of the above in your teachings. More specifically, you are asked to include in your narrative, how each of the above could be incorporated into your KICA unit. Please be sure to provide specific details about your incorporation, general statements about incorporation will not garner high marks.
10. **KICA Reflection** – Please reflect on your inquiry teaching presentation – 5% (individual, about 1.5 pages) Due: A week after your presentation.

11. **Summative/Cumulative Reflection – 5% (Individual) Due: Mar 5**
You are asked to write a reflective essay of some three to five pages (including references) based on your experiences in this course but on one or two specific concepts. In your essay, briefly describe why you chose the concepts and why it is important. Using the ProQuest Education Complete database from the Western Libraries website, locate two peer-reviewed research articles related to the main topic in your essay. Discuss the articles using the following guiding questions as headings:

1. What more did you learn about the concept(s)?
2. How does the information in the articles inform your future practice?
3. How would you or what are the different ways of incorporate(ing) the concepts into your science teaching practice?
4. Reference the articles carefully using APA format so that your instructor can easily locate and read the articles you have used in the essay.

**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.uwo.ca/univsec/academic_policies/rights_responsibilities.html](http://www.uwo.ca/univsec/academic_policies/rights_responsibilities.html)

**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: [https://www.edu.uwo.ca/teacher-education/docs/Attendance%20Policy%202016.pdf](https://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 5 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/programs/preservice-education/documents/policies/WEB_ScholasticDiscipline.pdf](http://www.edu.uwo.ca/programs/preservice-education/documents/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: http://www.edu.uwo.ca/programs/preservice-education/documents/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).

Use of Laptops & Notebooks in Class: As a courtesy to members of the class, please put your cell phone on ‘vibrate’ or turn it off during class. Laptops and other electronic devices may be used in a professional manner to facilitate your activities in the course, but out of courtesy to colleagues and the instructor, please do not engage in personal networking and non-course communication during class time – save it for before or after class, or for the break.

SUPPORT SERVICES
A variety of support services are available at Western.
If you need advice or assistance, do not hesitate to get in touch with any of these services.

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

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

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

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

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

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

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

EMOTIONAL or MENTAL DISTRESS: Students who are in emotional or mental distress should refer to Mental Health @ Western http://www.uwo.ca/uwocom/mentalhealth/ for a complete list of options about how to obtain help.

B.Ed./Dip.Ed. PROGRAM ISSUES: zuber@uwo.ca, Teacher Education Office, room 1131

NEED HELP but not sure what to do: zuber@uwo.ca, Teacher Education Office, room 1131

Class Schedule**

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<thead>
<tr>
<th>Date</th>
<th>Topics</th>
<th>Readings/Assignments</th>
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I/S Biology EDUC 5202 I/S Chemistry EDUC 5205 I/S Physics EDUC 5221
<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
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<tbody>
<tr>
<td>Sep 6</td>
<td>Introduction, Course Outline, Assignments</td>
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<tr>
<td>Sep 11</td>
<td>Assignments, Nature of Science</td>
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<td>Sep 13</td>
<td>Nature of Science and Scientific Inquiry</td>
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<td>Sep 18</td>
<td>What is Education? Nature of Teaching and Learning</td>
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<td>Sep 20</td>
<td>Nature of Science Education 21st Century Learning</td>
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<td>Sep 25</td>
<td>Ontario Science Curriculum</td>
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<td>Sep 27</td>
<td>How Children Learn? Nature of the Learner</td>
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<td>Oct 2</td>
<td>How Children Learn? Nature of the Learner</td>
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<td>Oct 4</td>
<td>Nature of Learning</td>
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<td>Oct 9–Oct 13</td>
<td>Reading Week (No Classes)</td>
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<td>Oct 9–Dec 8</td>
<td>Practicum Block 1 (No Classes)</td>
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<tr>
<td>Dec 12-Jan 6</td>
<td>Vacation (No Classes)</td>
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<tr>
<td>Feb 19</td>
<td>Family Day (No Class)</td>
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### Notes:
- Assignments: Nature of Science
- My Science Classroom Post
- My Science Classroom Feedback
- Commentary Case Study

### Additional Notes:
- 5E Lesson Plan (Pre)
- 5E Lesson Plan (Post)
- Lesson Reflection
- Due Nov 13
- KICA Unit Workbook

### Topics Covered:
- Inquiry Teaching
- Blooms Taxonomy in Lesson Planning
- Learning Theories
- Technology Incorporation in Science Learning and Teaching
- Indigenous Science Education
- Environmental/Sustainability Science Education
- Dilemmas/Controversies in Science
- Democratic Education/Nature of Power in the Educative Process
- Anti-Racist vs. Multicultural Science Education
- Classroom Management
- KICA Inquiry Lesson Presentation
- KICA Inquiry Presentation Sustainability/Environmental Stewardship
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<tr>
<th>Date</th>
<th>Activity 1</th>
<th>Activity 2</th>
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<tr>
<td>Feb 26</td>
<td>KICA Inquiry Lesson Presentation</td>
<td>KICA Inquiry Presentation Indigenous Knowledge in Science</td>
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<td>Feb 28</td>
<td>KICA Inquiry Lesson Presentation</td>
<td>Science Teacher Professional Development</td>
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<td>KICA Inquiry Presentation Technology Incorporation in Science</td>
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<td>Mar 5</td>
<td>KICA Inquiry Lesson Presentation</td>
<td>KICA Inquiry Presentation Summative/Cumulative Reflection on Course</td>
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<td>Mar 7</td>
<td>Life Long Learning, Professional Development</td>
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<tr>
<td>Mar 12 – Mar 16</td>
<td>Spring Break (No Classes)</td>
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<tr>
<td>Mar 19 – Apr 13</td>
<td>Practicum Block 2</td>
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**Tentative schedule of topics. Deviations may be necessary.**