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

Curriculum & Pedagogy in STEM Education
Intermediate/Senior 5466
Monday – 10:30 a.m.-12:30 p.m. – Rm 2051
Wednesday – 12:30 p.m.-2:30 p.m. – Rm 2036

Instructor: Dr. Isha DeCoito
Email: idecoito@uwo.ca; Telephone: 519-661-2111, ext. 84454
Office: Rm 1037; Office Hours: Wednesday (2:30 – 4:00 p.m.) or by appointment

Course Description
A focus on STEM education within the broader curricular spectrum. Teacher Candidates develop pedagogical content knowledge, and skills, technologies, instructional strategies, and assessments to support the design and development of STEM projects.

Learning Outcomes
On the successful completion of the course, students will:

- Provide conscientious and effective instruction in STEM education that upholds and models the ethical standards of the teaching profession (Care, Trust, Respect, and Integrity).
- Develop, use, and critically evaluate assessment and evaluation tools and strategies for use in STEM programs.
- Design, use, and critically evaluate teaching, learning, assessment, and evaluation resources for use in the STEM.
- Utilize effective strategies for fostering a safe, positive, and socially just and equitable learning environment in the context of teaching STEM.
- Effectively use relevant Ontario curricula and related policy documents in the context of teaching STEM.
- Support students in the use of information communication technology in the lab and classroom.
- Understand the role of STEM and its place in society, including its philosophical and socio-cultural underpinnings, the limitations of STEM, and the connections among science, technology, society, and the environment.
Course Overview
This course promotes the development of science teaching professionals through in-depth analysis of teaching procedures, constructivist models that reveal and promote student understanding of STEM, and materials for selecting and organizing instruction. Students develop interdisciplinary focused curricula that incorporate these aspects of teaching and learning, and the appropriate use of technology, authentic assessment, and current STEM and educational research. The course provides opportunity for professional growth through reviews of professional literature, participation in professional science education organizations, and contribution to national, state and/or local school STEM activities. You will be given opportunities to reflect upon:

- STEM pedagogy based on “student-centered” and “constructivist” models of learning;
- Strategies for dealing with values education and equity and environmental issues in the STEM;
- Appropriate strategies for assessing student understanding and evaluating student performance;
- How to create “non-threatening” learning environments;
- Curriculum planning and design and program modification strategies;
- Strategies for planning lessons, units of study incorporating Science, Technology, Engineering, and Mathematics education;
- Students learning styles and the needs of all students; and
- Your own teaching performance and professional growth.

You will also be expected to uphold the Standards of Practice for the Teaching Profession in Ontario by demonstrating a commitment to students and student learning; a commitment to ongoing professional learning through promotion and participation in professional learning communities, and a commitment to the application of professional knowledge, skills, and experience in the promotion of student learning.

Texts
There is no required textbook for this course.
ALL REQUIRED READINGS WILL BE POSTED ON SAKAI.
Please complete your readings before coming to class. You will be expected to discuss your readings and reflect on them.

Ministry Documents
Readings


Assignments

The course assignments are designed to support teacher candidates’ (TCs) growth and development as a teacher. These are opportunities for the participants to show improvement in their skills and to sustain continued improvement in their personal practice.

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Grade Value (%)</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Case Study</td>
<td>25</td>
<td>November 1, 2017</td>
</tr>
<tr>
<td>2. STEM Project</td>
<td>30</td>
<td>January 15, 2018</td>
</tr>
<tr>
<td>3. Website Resource</td>
<td>35</td>
<td>January 31, 2018</td>
</tr>
<tr>
<td>4. Professionalism</td>
<td>10</td>
<td>On-going</td>
</tr>
</tbody>
</table>

1. **Case Studies in STEM Education (25%)**

   **Due on November 1, 2017**

   This assignment involves a team of 4 TCs working together to develop a digital case study that is interactive (including videos, images, simulations, etc.). The digital case study will be based on a socio-scientific issue around STEM education (e.g., environmental sustainability, healthcare, social issues, etc.). It should be aligned with the Application expectations of the Ministry of Education Ontario Curriculum: Science, Grades 10-12.

2. **STEM Projects in Teacher Education (30%)**

   **Due on January 15, 2018**

   The STEM project involves 4 TCs working together to prepare 4 lesson plans, using a digital format and an inquiry STEM project for a topic in one of the strands from the Ministry of Education Ontario Curriculum: Science, Grades 10-12.

3. **Curriculum Website Resource (35%)**

   **Due on January 31, 2018**

   In groups (the number of TCs per group will be student-instructor negotiated), TCs will develop and produce a multimedia resource suitable for use by grades 11 or 12 science teachers. Each resource will address topics within one unit/strand of the Biology, Chemistry or Physics curriculum (not including Unit A). Each resource will include a variety of instructional and assessment exercises focused on the development of curriculum-based concepts, inquiry skills (including STEM connections), creativity, and STSE skills. The resource will include 2-3 introductory pages containing the title of the resource, the curricular course code, author names, and the date of submission. The resource will also include a table of contents near the beginning and a glossary of key technical terms near the end. Groups may establish active links to specific websites, images, and multimedia learning objects on the Internet, but will not copy...
into the resource any copyright protected materials (found in print books or the Internet). A minimum of one creative piece is required per student; each creative piece will be identified with the creator’s name. Groups are encouraged to develop and include as many self-created print and/or digital multimedia learning objects as possible.

5. **PROFESSIONALISM (10%)**

Course participation focuses on 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**.

The Professionalism Rubric will be posted on Sakai.

---

**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/programs/preservice-education/documents/policies/Accessibility_Western.pdf](http://www.edu.uwo.ca/programs/preservice-education/documents/policies/Accessibility_Western.pdf)

**Attendance:** The B.Ed. program is intense and a demanding program of professional preparation in which teacher candidates are expected to demonstrate high levels of both academic and professional integrity. Such integrity is demonstrated in part by commitment to and attendance at all classes, workshops, tutorials, and practicum activities. Read more about the Faculty's attendance policy at [http://www.edu.uwo.ca/programs/preservice-education/Attendance%20Policy%202016.pdf](http://www.edu.uwo.ca/programs/preservice-education/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, all teacher candidates must demonstrate the ability to write clearly and correctly. Work which shows a lack of 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 the teacher candidate for revision to a literate level.
Late Penalties: Normally, the only acceptable reasons for late or missed assignments are illness (for which a doctor’s statement may be required) 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

Plagiarism: Plagiarism means presenting someone else’s words or ideas as one’s own. The concept applies to all assignments, including lesson and unit plans, laboratory reports, diagrams, and computer projects. For further information, teacher candidates may consult their instructors, the Associate Dean’s Office, and current style manuals. Advice about plagiarism and how to avoid it can also be found on the Preservice website: http://www.edu.uwo.ca/programs/preservice-education/documents/policies/WEB_PlagiarismPolicy.pdf

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. PROGRAM ISSUES: zuber@uwo.ca, Teacher Education Office, room 1166

NEED HELP but not sure what to do: zuber@uwo.ca, Teacher Education Office, room 1166
## COURSE SCHEDULE

<table>
<thead>
<tr>
<th>DATE</th>
<th>TOPIC</th>
<th>ASSIGNMENT DUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>October 16</td>
<td><strong>Course Introduction/Outline</strong> - assignments, policies, etc.</td>
<td></td>
</tr>
<tr>
<td>October 18</td>
<td><strong>Introduction to case studies</strong> - research and development of case studies</td>
<td>Specify topic and sign up for Case Studies</td>
</tr>
<tr>
<td>October 23</td>
<td><strong>STSE Education</strong> - linking SSI/STSE and case studies</td>
<td></td>
</tr>
<tr>
<td>October 25</td>
<td><strong>Student/group Conferencing</strong> - progress of case studies</td>
<td>Case Study - Lesson Plans</td>
</tr>
<tr>
<td>October 30</td>
<td><strong>Case Studies</strong> - group facilitation</td>
<td>Draft of Case Study</td>
</tr>
<tr>
<td>November 1</td>
<td><strong>Case Study Presentations</strong></td>
<td>CASE STUDIES DUE PRESENTATIONS</td>
</tr>
<tr>
<td>November 6</td>
<td><strong>Seminars: Assessment and Evaluation</strong></td>
<td></td>
</tr>
<tr>
<td>November 8</td>
<td><strong>STEM Projects in Teacher Education</strong> - the engineering design process (guest)</td>
<td>Sign up for STEM Project</td>
</tr>
<tr>
<td>November 13</td>
<td><strong>R &amp; D - STEM Projects</strong> - group facilitation</td>
<td></td>
</tr>
<tr>
<td>November 15</td>
<td><strong>R &amp; D – STEM Projects</strong> - end of year reflections</td>
<td>STEM Project - Lesson Plans Due</td>
</tr>
<tr>
<td>January 8</td>
<td><strong>STEM Projects</strong> - reflections &amp; Group facilitation</td>
<td></td>
</tr>
<tr>
<td>January 10</td>
<td><strong>Curriculum Development in STEM Education</strong> - developing educative materials in STEM</td>
<td>Sign up for Curriculum Resources Website</td>
</tr>
<tr>
<td>January 15</td>
<td><strong>STEM Project Presentations</strong></td>
<td>STEM PROJECT DUE PRESENTATIONS</td>
</tr>
<tr>
<td>January 17</td>
<td><strong>R &amp; D – Curriculum Resources</strong></td>
<td></td>
</tr>
<tr>
<td>January 22</td>
<td><strong>Group Conferencing/Facilitation</strong> - progress reporting/group member</td>
<td>Progress Report #1</td>
</tr>
<tr>
<td>January 24</td>
<td><strong>Development of curriculum resources</strong> - group facilitation</td>
<td></td>
</tr>
<tr>
<td>January 29</td>
<td><strong>Group Conferencing/Facilitation</strong> - progress reporting/group member</td>
<td>Progress Report #2</td>
</tr>
<tr>
<td>January 31</td>
<td><strong>Website Resource Presentations</strong> - peer feedback</td>
<td>WEBSITE RESOURCE PRESENTATIONS</td>
</tr>
</tbody>
</table>

**READING WEEK, AFE, VACATION**

<table>
<thead>
<tr>
<th>DATE</th>
<th>TOPIC</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>January 8</td>
<td><strong>STEM Projects</strong> - reflections &amp; Group facilitation</td>
<td></td>
</tr>
<tr>
<td>January 10</td>
<td><strong>Curriculum Development in STEM Education</strong> - developing educative materials in STEM</td>
<td>Sign up for Curriculum Resources Website</td>
</tr>
<tr>
<td>January 15</td>
<td><strong>STEM Project Presentations</strong></td>
<td></td>
</tr>
<tr>
<td>January 17</td>
<td><strong>R &amp; D – Curriculum Resources</strong></td>
<td></td>
</tr>
<tr>
<td>January 22</td>
<td><strong>Group Conferencing/Facilitation</strong> - progress reporting/group member</td>
<td>Progress Report #1</td>
</tr>
<tr>
<td>January 24</td>
<td><strong>Development of curriculum resources</strong> - group facilitation</td>
<td></td>
</tr>
<tr>
<td>January 29</td>
<td><strong>Group Conferencing/Facilitation</strong> - progress reporting/group member</td>
<td>Progress Report #2</td>
</tr>
<tr>
<td>January 31</td>
<td><strong>Website Resource Presentations</strong> - peer feedback</td>
<td>WEBSITE RESOURCE PRESENTATIONS</td>
</tr>
</tbody>
</table>