*Department of Curriculum and Pedagogy*

EDCP 470 + 471A (3): **ICT Practices in Education + Technological Practices in Education:
Technical Problems in Robotics**

**Summer 2a 2017**

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| **Instructor:** Peter Halim**Office Hours:** By appointment**Email:** peterhalim@gmail.com  |  |
| **Website:** <http://blogs.ubc.ca/roboted>  |

## **COURSE DESCRIPTION**

This is an advanced curriculum course focusing on the design and implementation of instructional resources for Science, Technology, Engineering, and Mathematics (STEM) and/or Applied Design, Skills and Technologies (ADST) education. The emphasis in this summer 2017 section is on developing course materials, curriculum, and learning the inner workings of VEX IQ robotics. The course balances hands-on design and programming of robots (Lego Mindstorms and VEX) with the development and implementation of robotics courses and curriculum.

## COURSE OBJECTIVES

Upon completion of this course, the student should be able to:

1. Explore key concepts and techniques in STEM and ADST with a focus on robotics and computational thinking.
2. Provide a rationale for robotics education and literacy at all levels: elementary, middle school, high school and adult.
3. Evaluate robotics education instructional materials and recommend appropriate revisions.
4. Design and select appropriate materials and resources for robotics education courses.
5. Gain practical knowledge applicable to teaching VEX IQ and Lego Mindstorm in the classrooms.
6. Gain insights into protecting students’ personal information and data.

**Texts & Lab Fee for EDCP 470/471A:**

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| **Resources & Readings:** Download at <http://blogs.ubc.ca/roboted/>  |

## ASSESSMENT AND MARKS (see details below)

**Students will complete the following assignments:**

Class participation 60%

Project 40%

**POLICIES**

Policies regarding attendance and missed or late assignments will follow those recommended by the University and the Faculty of Education.

**Academic Honesty and Standards, and Academic Freedom:** Please refer to *UBC Calendar 2016/17* Policies and Regulations (Selected): <http://www.calendar.ubc.ca/vancouver/>

**Academic Accommodation for Students with Disabilities:** Students with a disability who wish to have an academic accommodation should contact the Disability Resource Centre without delay (see UBC Policy #73 <http://universitycounsel.ubc.ca/files/2010/08/policy73.pdf>).

**Attendance policy:**

If you must miss a class, notify your instructor immediately. The nature of the Teacher Education Program is participatory. Teacher candidates who miss a significant amount of class time (i.e. more than 15% of course hours) are normally required to repeat the course. Teacher candidates are not able to proceed to practicum until all prior courses are successfully completed. See <http://teach.educ.ubc.ca/students/policies-and-guides/>

## Policy for Letter Grades:

Operational Definition of Letter Grade Categories
(EDCP, Revised, June 1996)

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| **Letter** | **Percent**  |  |
| **Grade** | **Range**  | **Sample Description**  |
|  |  | **Work of outstanding quality.** Demonstrates excellent comprehension of the subject and use of existing literature and research. Consistently applies a high level of critical scrutiny to texts and discussions. Frequently articulates innovative ideas based on a broad background. Shows a high degree of personal engagement with the topic. Consistently integrates broad orientations towards curriculum with particular lesson objectives and instruction and assessment strategies.  |
|  A+ | 90-100 |
|  |  |
|  A | 85-89 |
|  |  |
|  A- | 80-84 |
|  |  |
|  |  |
|  |  | **Work of good quality with no major weaknesses**. Demonstrates good comprehension of the subject. Is able on occasion to articulate original critical insights. Good use of existing knowledge in the subject. Shows personal involvement in the work. Understands the relationships among broad curriculum orientations, lesson objectives and instruction and assessment strategies.  |
|  B+ | 76-79 |
|  |  |
|  B | 72-75 |
|  |  |
|  B- | 68-71 |
|  |  | **Adequate work.** Fair comprehension of the subject. Shows few original critical insights. Background knowledge may have significant deficits. Minimal personal involvement in the work. Inconsistently integrates broad curriculum orientations, lesson objectives and instruction and assessment strategies.  |
|  C+ | 64-67 |
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|  C | 60-63 |
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|  C- | 55-59 |
|  |  | **Minimally adequate work, barely at a passing level.** Serious flaws or deficits in understanding. Unable to integrate broad curriculum orientations, lesson objectives and instruction and assessment strategies.  |
|  D | 50-54 |
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|  |  | **Failing work.** Inadequate for successful completion of the course or submitted beyond final date of acceptance.  |
|  F | 0-49 |
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**Participation (60%)**

Participation is valued at 60% of your final grade. Participation is interdependent with **preparation** for each class, which involves;

***reading*** (see website for videos and articles, comments & questions, etc.),

***writing*** and ***speaking*** (discussing, corresponding with peers, chat, personalizing lessons, etc.).

In addition, participation in-class involves,

***designing, programming and testing*** (manipulating robots, coding, etc.) and

***critiquing*** (providing respectful suggestions for improvement).

Students are expected to be present for all days in session, teach and present on chosen due dates, and finally strive to share presentations and course materials that are **polished**, **creative**, **unique**, and **informative**.

**Participation Marks**

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| **Low**------------**Avg**------------**High**Appropriately and accurately articulates key constructs and themes in readings, robotics equipment, etc.1---------------6---------------10Reveals an attempt to synthesize knowledge through creating and designing, sharing ideas, and exploring course related content.1---------------6---------------10Provides thoughtful, coherent, respectful and constructive feedback throughout course teaching practice sessions.1---------------12---------------20**Total:** xx / 40 |

**Lesson (40%) [Due: August 6-11, 2017] (40%)**

Design a lesson (80 minutes) focusing on **robotics** and/or **computational thinking** to instruct students on specific **ADST**inspired challenges (e.g., assembly, design, programming, etc.).

Choose a topic that;

1. is coordinated with your peers;
2. is appropriate, appealing, and relevant to students at either the grades 6-7, 8-10 or 11-12 levels;
3. addresses a challenging procedure;
4. relates and connects the lessons’ learning objectives with BC Applied Design, Skills and Technologies curriculum.

For final submission include the following in a shareable format (preferably digital):

1. Lesson plan.
2. Resource materials (video would be ideal and/or handouts).
3. Reflection and synthesized feedback from your practice session.

The lesson plan should identify and include the following:

1. Logical and identifiable timeline or chronological order.
2. ADST learning objectives and outcomes (competencies and content)
3. Connections to core competencies and big ideas.
4. Required learning / support materials.

The lessons’ supporting materials should identify and include the following elements:

* 1. **Title/Introduction**: Introduce your tutorial and its learning outcomes.
	2. **Procedural Challenge**: What challenge does procedure describe and resolve?
	3. **Text and Audio/Visual**: Write/ effective text and insert appropriate images or reference sound files to provide a fully descriptive procedure.
	4. **Focus Points:** Provide steps that allow for pause and challenge the students to think through decision trees. (Design based thinking)
	5. **Next steps:** Include next logical steps for the students to pursue after completing the procedure described in the tutorial.
	6. **Professional Format**: Uses a variety of digital technologies (interactivity, audio, visual) for tutorial design.

**Lesson Marks**

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| **Low**------------**Avg**------------**High**Clarity of communication1---------------6---------------10Development and logical flow of procedures1---------------6---------------10Balance of effective animation, still images & text, and design1---------------6---------------10Reflection and Synthesized Feedback1---------------12---------------20Quality and polish of learning materials1---------------12---------------20**Total:** xx /  |

## COURSE OUTLINE



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| **WEEK 1: Investigating and Designing** |
| **Class 1 (07/24)** | Introduction to robotic systems and software. |
| **Activity** | Build a tank and introduction to programming. |
| **Readings & Resources** | See class website. |
| **Class 2 (07/25)** | Review robotic systems and programming software. |
| **Activity** | Investigate and evaluate learning resources (digital and physical) for use in your teaching practices.  |
| **Readings & Resources** | See class website. |
| **Class 3 (07/26)** | Teaching a robotics course; procedures, challenges, and ideas. |
| **Activity**  | Identify the possible learning outcomes of completing a simple robotics based challenge or game. (BC ADST)Review BC Privacy of Information regulations regarding K-12 |
| **Readings & Resources** | See class website. |
| **Class 4 (07/27)** | Teaching a robotics course; creating, developing, and implementing.  |
| **Activity**  | Investigate and experiment different robotics systems for creating and implementing a robotics or ICT based lesson in a classroom. |
| **Readings & Resources** | See class website. |
| **Class 5 (07/28)** | Teaching computational thinking (CT) and coding in BC. |
| **Activity** | Investigate and experiment with different technologies and educational resources for introducing and teaching CT and coding in ADST. |
| **Readings & Resources** | See class website. |
| **WEEK 2: Teaching, Evaluating, and Revising** |
| **Class 5 (07/31)** | Develop and design a lesson **(Main Assignment)** |
| **Activity** | Design and create your own mini ADST challenge/lesson using any robotics or coding system/software of your choosing. |
| **Class 6 (08/01)** | Teach a lesson, evaluate, and revise. |
| **Activity** | Groups teach the class; review and revise. |
| **Class 7 (08/02)** | Teach a lesson, evaluate, and revise. |
| **Activity** | Groups teach the class; review and revise. |
| **Class 8 (08/03)** | Teach a lesson, evaluate, and revise. |
| **Activity** | Groups teach the class; review and revise. |
| **Class 9 (08/04)** | Teach a lesson, evaluate, and revise. |
| **Activity** | Groups teach the class; review and revise. |
| **WEEK 3: Teaching, Evaluating, and Reflecting** |
| **Class 11 (08/07)** | BC Day – No Class |
| **Class 12 (08/08)** | Teach a lesson, evaluate, and revise. |
| **Activity** | Groups teach the class; review and revise. |
| **Class 13 (08/09)** | Teach a lesson, evaluate, and revise. |
| **Activity** | Groups teach the class; review and revise. |
| **Class 14 (08/10)** | Work and Overflow Day. |
| **Activity** |  |
| **Class 15 (08/11)** | Final Class (all final lesson materials due) |
| **Activity** |  |