

AB

EDUC 460.22: Specialization I K-12 Mathematics Summer, 2023

| Section | Instructor | Dates | Location/Time | Email |
|---------|----------------|-------|-------------------------|-------|
| S01 | Laura Tennisco | MTWRF | EDC 353 from 9:00-11:50 | TBA |

Class Dates: Monday through Friday, July 10, 2023-July 21, 2023 Office Hours: By appointment only

Last Day to Add/Drop/Swap: Due to the non-standard dates associated with this program, please check your Student Centre for the important dates pertaining to your section.

Pre-requisite: Due to the multiple pathways in the Bachelor of Education, please consult Undergraduate Programs in Education for questions related to pre-requisite courses.

Email: Students are required to use a University of Calgary (@ucalgary.ca) email address for all correspondence.

COURSE DESCRIPTION:

The intent of the Specialization I course is to introduce students to the concepts, theory and design planning related to teaching within the specialization of Mathematics. Theory, as connected to an understanding of practical classroom experiences, will particularly inform the course curriculum and will be explored through course readings, analysis of teaching/learning artifacts and through the design of discipline-based learning and assessment plans. Topics in teaching and learning will include teaching inclusively and addressing the needs of diverse learners, effective integration of technology and disciplinebased inquiry. Assignments will present the opportunity for students to develop an understanding of shortterm instructional design and to begin to examine curriculum shifts in the province.

LEARNER OUTCOMES:

Over the course of the semester, students will:

- 1) Develop a foundational understanding of the nature of discourse in the discipline, as related to teaching and learning, including specialized language, concepts, and terminology;
- 2) Understand teacher as designer of learning and assessment plans, and use of the resources available for designing learning and assessment.
- 3) Explore and apply introductory theory related to the teaching of the discipline with an emphasis on designing discipline-based tasks and assessment processes and creating an adaptive classroom learning environment to better meet the needs of today's diverse learners.
- 4) Successfully design short-term learning and assessment plans to deepen understanding of key ideas/concepts within the discipline.

COURSE DESIGN AND DELIVERY: This course will be delivered face-to-face on campus.



REQUIRED RESOURCES [PLEASE SEE D2L FOR COPIES]:

- Alberta Education (2016). *Program of Study: Mathematics Kindergarten to Grade 9*. Edmonton: Government of Alberta. <u>https://education.alberta.ca/media/3115252/2016 k to 9 math pos.pdf</u>
- Alberta Education (2008). *Program of Study: Mathematics Grade 10-12*. Edmonton: Government of Alberta. <u>https://education.alberta.ca/media/564028/math10to12.pdf</u>
- Boaler, J. (2016). *Mathematical Mindsets* [Chapter 3, pp. 21-32]. San Francisco, CA: Jossey-Bass. [on D2L] <u>https://ebookcentral-proquest-com.ezproxy.lib.ucalgary.ca/lib/ucalgary-</u> <u>ebooks/detail.action?docID=4444210</u>
- Kilpatrick, J., Swafford, J., & Bradford, F. (2001a). The stands of mathematical proficiency. In Adding it up: Helping children learn mathematics (pp. 115-155). National Academy Press. <u>https://www.nap.edu/catalog/9822/adding-it-up-helping-children-learn-mathematics</u> Also available in LCR <u>https://ebookcentral-proquest-com.ezproxy.lib.ucalgary.ca/lib/ucalgary-</u>

ebooks/reader.action?docID=3375421&ppg=136

- Gilbert, J. M. & Coomes, J. (February 2010). What Mathematics Do High School Teachers Need to Know? *The Mathematics Teacher*, 103(6), 418-423. [UC library] <u>What Mathematics Do High School</u> <u>Teachers Need to Know? on JSTOR (ucalgary.ca)</u>
- Jaworski, B. (2015). Teaching for mathematical thinking: Inquiry in mathematics learning and teaching. *Mathematics Teaching, 248,* 28-34. <u>https://www.atm.org.uk/write/MediaUploads/Journals/MT248/MT248-15-11.pdf</u> *Also available in LCR:* <u>https://ezproxy.lib.ucalgary.ca/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=eh</u>

h&AN=110191133&site=ehost-live

- Ontario. (2014). *Paying attention to spatial reasoning*. Government of Ontario. <u>http://thegamesmethod.com/wp-content/uploads/2015/04/LNSPayingAttention.pdf</u>
- Van de Walle, J.A., Karp, K.S., Bay-Williams, J.M., & McGarvey, L.M. (2022). Chapter 1: Teaching and learning mathematics in the twenty-first century. *Elementary and middle school mathematics: Teaching Developmentally (6th Canadian ed.)*. Pearson Canada. Pp. 1-13 *Posted in D2L*
- Van de Walle, J.A., Karp, K.S., Bay-Williams, J.M., & McGarvey, L.M. (2022). Chapter 3: Mathematical inquiry through rich tasks and classroom discourse. *Elementary and middle school mathematics: Teaching Developmentally (6th Canadian ed.)*. Pearson Canada. Pp. 35-55 *Posted in D2L*
- Van de Walle, J.A., Karp, K.S., Bay-Williams, J.M., & McGarvey, L.M. (2022). Chpater 4: Preparing to teach and planning for mathematics learning. *Elementary and middle school mathematics: Teaching Developmentally (6th Canadian ed.)*. Pearson Canada.pp. 57-76 *Posted in D2L*

ADDITIONAL RESOURCES:

Aikenhead, G. (2017). Educational contexts. In School mathematics for reconciliation: From a 19th to a 21st century curriculum (pp.14-26). Aboriginal Education Research Center. <u>https://education.usask.ca/documents/profiles/aikenhead/School-Mathematics-for-Reconciliation-vB11.pdf</u>



Alberta Education (2008). Assessment in mathematics. Available online at: <u>http://www.learnalberta.ca/content/mewa/html/assessment/index.html</u>

- Alberta Education (2010). *Making a difference: Meeting diverse learning needs with differentiated instruction*. <u>https://open.alberta.ca/publications/9780778586012</u>
- Boaler, J. (2016). *Mathematical Mindsets* [Chapter 3, pp. 21-32]. San Francisco, CA: Jossey-Bass. [on D2L] <u>https://ebookcentral-proquest-com.ezproxy.lib.ucalgary.ca/lib/ucalgary-ebooks/detail.action?docID=4444210</u>

Kilpatrick, J., Swafford, J., & Bradford, F. (2001b). Teaching for mathematical proficiency. In Adding it up: Helping children learn mathematics (pp. 313-368). National Academy Press. <u>https://www.nap.edu/catalog/9822/adding-it-up-helping-children-learn-mathematics</u> Also available in LCR: <u>https://ebookcentral-proquest-com.ezproxy.lib.ucalgary.ca/lib/ucalgary-</u> ebooks/reader.action?docID=3375421&ppg=334

Liljedahl, P. (2021). How we foster student autonomy in a thinking classroom. In *Building thinking classrooms in mathematics, Grades K-12: 14 teaching practices for enhancing learning* (pp. 132-142). Corwin https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=2637712&site=ehost-live&ebv=EB&ppid=pp_132

*E-book licence permits only one online user at a time; per day, a user may print to PDF up to 100 pages

Liljedahl, P. (2021). How we use formative assessment in a thinking classroom. In *Building thinking classrooms in mathematics, Grades K-12: 14 teaching practices for enhancing learning* (pp. 230-251). Corwin. https://ezproxy.lib.ucalgary.ca/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=nle

bk&AN=2637712&site=ehost-live&ebv=EB&ppid=pp_230

*E-book licence permits only one online user at a time; per day, a user may print to PDF up to 100 pages

Liljedahl, P. (2021). How we use hints and extensions in a thinking classroom. In *Building thinking* classrooms in mathematics, Grades K-12: 14 teaching practices for enhancing learning (pp. 144-169). Corwin

<u>https://ezproxy.lib.ucalgary.ca/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=nle bk&AN=2637712&site=ehost-live&ebv=EB&ppid=pp_144</u> **E-book licence permits only one online user at a time; per day, a user may print to PDF up to 100 pages*

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- Mathigon. (2020). *Polypad*. UCL Institute of Education in London. <u>https://mathigon.org/polypad</u> [virtual math manipulatives]
- Mc Tighe, J. & Wiggins, G. (2014). Improve curriculum, assessment, and instruction using the understanding by design framework. ASCD White Paper. <u>https://www.jaymctighe.com/wp-content/uploads/2011/04/UbD-White-Paper-June-20141.pdf</u>
- SFUSD Math (2016). Visual Model Progressions. <u>http://www.sfusdmath.org/visual-model-progressions.html</u>
- The Common Curriculum Framework for K-9 Mathematics https://open.alberta.ca/publications/3949146



Van de Walle, J.A., Karp, K.S., Bay-Williams, J.M., & McGarvey, L.M. (2022). Elementary and middle school mathematics: Teaching Developmentally (6th Canadian ed.). Pearson Canada.
 *Note: Electronic version of this text includes multiple classroom videos and downloadable teacher resources – cost \$49.00 Teacher Education (pearson.com) Hard copy of older versions available in Doucette Library. <u>https://www.pearson.com/store/p/van-de-walle---elementary-and-middle-school-mathematics-sixth-canadian-edition/P100003049904/9780137435135</u>

| LEARNING TASK | DESCRIPTION OF LEARNING TASK | GROUPING | WEIGHT | DUE DATE |
|------------------|--|------------|--------|---|
| 1 | Analysis of a Learning Design and Assessment Plan | Groups | 30% | Friday, July 14 |
| 2 | Developing Conceptual Understandings of Math Concepts (Mathematics Knowledge for Teaching) | Groups | 30% | July 17 th -21 st (sign-up for date) |
| 3 | Creation of Short-term Learning and Assessment Plan | Individual | 40% | Wednesday, July 26th |

LEARNING TASKS OVERVIEW

WEEKLY COURSE SCHEDULE:

| Date | Topics | Readings | Due Dates |
|----------------------------|---|---|-----------|
| Day 1 Mon., July 10 | Introduction: Mathematics Teaching and Learning Essential Question: What is mathematics, and why does it matter? | Van de Walle, J.A., Karp, K.S., Bay-Williams, J.M., & McGarvey, L.M. (2022). Chapter 1: Teaching and learning mathematics in the twenty-first century. <i>Elementary and middle</i> <i>school mathematics: Teaching</i> <i>Developmentally (6th Canadian ed.)</i>. Pearson Canada. Boaler, J. (2016). <i>Mathematical Mindsets</i> [Chapter 3, pp. 21-32]. San Francisco, CA: Jossey-Bass. [on D2L] <u>https://ebookcentral-proquest- com.ezproxy.lib.ucalgary.ca/lib/ucalgary- ebooks/detail.action?docID=4444210</u> | |
| Day 2 Tues., July 11 | Mathematical Proficiency and Curriculum Introduction Essential Question: What constitutes the learning of mathematics? | Kilpatrick, J., Swafford, J., & Bradford, F. (2001a). The strands of mathematical proficiency. In Adding it up: Helping children learn mathematics (pp. 115-155). National Academy Press. <u>https://www.nap.edu/catalog/9822/adding-it-up-helping-children-learn-mathematics</u> Alberta Education (2016). Program of Study: Mathematics Kindergarten to Grade 9. Edmonton: Government of Alberta. <u>https://education.alberta.ca/media/3115252/20</u> <u>16_k_to_9_math_pos.pdf</u> | |



| Day 3 Wed., July 12 | Mathematical Inquiry, Rich Math Tasks, and Mathematical Discourse Essential Question: What constitutes the teaching of mathematics? | Alberta Education (2008). Program of Study: Mathematics Grade 10-12. Edmonton: Government of Alberta. https://education.alberta.ca/media/564028/mat h10to12.pdf Van de Walle, J.A., Karp, K.S., Bay-Williams, J.M., & McGarvey, L.M. (2022). Chapter 3: Mathematical inquiry through rich tasks and classroom discourse. Elementary and middle school mathematics: Teaching Developmentally (6th Canadian ed.). Pearson Canada. Jaworski, B. (2015). Teaching for mathematical thinking: Inquiry in mathematics learning and teaching. Mathematics Teaching, 248, 28-34. https://www.atm.org.uk/write/MediaUploads/ Journals/MT248/MT248-15-11.pdf Also available in LCR: https://ezproxy.lib.ucalgary.ca/login?url=https ://search.ebscohost.com/login.aspy?direct=tru | |
|----------------------------|--|---|--|
| Day 4 Thur., July 13 | Mathematical Thinking and Spatial Reasoning Essential Question: <i>How can spatial</i> <i>reasoning be promoted</i> <i>in the mathematics</i> <i>classroom?</i> | Search.ebsconost.com/login.aspx/direct=tru e&db=ehh&AN=110191133&site=ehost-live Ontario. (2014). Paying attention to spatial reasoning. Government of Ontario. http://thegamesmethod.com/wp-content/uploads/2015/04/LNSPayingAttention .pdf | |
| Day 5 Fri., July 14 | Mathematics Knowledge for Teaching Essential Question: <i>How can learning be</i> <i>designed with</i> <i>concreteness fading in</i> <i>mind?</i> | Optional: Liljedahl, P. (2021). How we use hints and extensions in a thinking classroom. In <i>Building thinking</i> <i>classrooms in mathematics, Grades K-12: 14</i> <i>teaching practices for enhancing learning</i> (pp. 144-169). Corwin <u>https://ezproxy.lib.ucalgary.ca/login?url=https</u> <u>://search.ebscohost.com/login.aspx?direct=tru</u> <u>e&db=nlebk&AN=2637712&site=ehost-</u> <u>live&ebv=EB&ppid=pp_144</u> *E-book licence permits only one online user at a time; per day, a user may print to PDF up to 100 pages | LT1 Due Fri., July 14 th |



| Day 6 Mon., July 17 | Lesson Design Essential Question: <i>How can key</i> <i>components of</i> <i>Understanding by</i> <i>Design be applied to</i> <i>create learning and</i> <i>assessment plans?</i> | Van de Walle, J.A., Karp, K.S., Bay-Williams, J.M., & McGarvey, L.M. (2022). Chapter 4: Preparing to teach and planning for mathematics learning. <i>Elementary and middle</i> <i>school mathematics: Teaching</i> <i>Developmentally (6th Canadian ed.)</i>. Pearson Canada. Additional: Mc Tighe, J. & Wiggins, G. (2014). <i>Improve</i> <i>curriculum, assessment, and instruction using</i> <i>the understanding by design framework</i>. ASCD White Paper. <u>https://www.jaymctighe.com/wp- content/uploads/2011/04/UbD-White-Paper-</u> <u>lune-20141 pdf</u> | LT2 Due July 17 th - July 21 st (sign up for date of presentation) |
|----------------------------|--|---|--|
| Day 7 Tues., July 18 | Lesson Design Essential Question: <i>How can key</i> <i>components of</i> <i>Understanding by</i> <i>Design be applied to</i> <i>create learning and</i> <i>assessment plans?</i> | Alberta Education (2016). <i>Program of Study:</i> <i>Mathematics Kindergarten to Grade 9</i> . Edmonton: Government of Alberta. <u>https://education.alberta.ca/media/3115252/20</u> <u>16_k_to_9_math_pos.pdf</u> Alberta Education (2008). <i>Program of Study:</i> <i>Mathematics Grade 10-12</i> . Edmonton: Government of Alberta. <u>https://education.alberta.ca/media/564028/math10to1</u> <u>2.pdf</u> | |
| Day 8 Wed., July 19 | Inquiry-based student- centered teaching/learning of mathematics Essential Question: <i>What does it mean to</i> <i>be a teacher of</i> <i>diversity?</i> | Optional: Kilpatrick, J., Swafford, J., & Bradford, F. (2001b). Teaching for mathematical proficiency. In <i>Adding it up: Helping children learn</i> <i>mathematics</i> (pp. 313-368). National Academy Press. <u>https://www.nap.edu/catalog/9822/adding-it-up-helping-children-learn-mathematics</u> <i>Also available in LCR:</i> <u>https://ebookcentral-proquest- com.ezproxy.lib.ucalgary.ca/lib/ucalgary- ebooks/reader.action?docID=3375421&ppg=3 34</u> | |
| Day 9 Thur., July 20 | Mathematics Knowledge for Teaching Essential Question: <i>How can the</i> <i>responsibility for</i> <i>learning be shifted</i> <i>from the teacher to the</i> <i>students?</i> | Liljedahl, P. (2021). How we foster student autonomy in a thinking classroom. In <i>Building thinking</i> <i>classrooms in mathematics, Grades K-12: 14</i> <i>teaching practices for enhancing learning</i> (pp. 132-142). Corwin https://ezproxy.lib.ucalgary.ca/login?url=https ://search.ebscohost.com/login.aspx?direct=tru e&db=nlebk&AN=2637712&site=ehost- live&ebv=EB&ppid=pp_144 *E-book licence permits only one online user at a time; per day, a user may print to PDF up to 100 pages | |



| Day 10 Fri., July 21 | Incorporating Indigenous Ways of Knowing | Additional: Aikenhead, G. (2017). Educational contexts. In School mathematics for reconciliation: From a 19th to a 21st century curriculum (pp. 14-26). Aboriginal Education Research Center. | LT 3 Due Wednesday July 26 th |
|----------------------------|--|---|--|
| | Essential Question: <i>How can mathematics</i> <i>be taught in</i> <i>relationship with</i> <i>Indigenous Ways of</i> <i>Knowing?</i> | https://education.usask.ca/documents/profiles/aikenhead/S chool-Mathematics-for-Reconciliation-vB11.pdf | |

CHANGES TO SCHEDULE:

Please note that changes to the schedule may occur to meet the emerging needs and dynamics of the participants in the course.

LEARNING TASKS AND ASSESSMENT

There are 3 required Learning Tasks for this course.

1. LEARNING TASK 1: Analysis of a Learning Design and Assessment Plan-DUE: Monday, July 18th

For this assignment, in groups, you will analyze a learning design and assessment plan (lesson plan) that you have found online. The purposes will be to foster professional learning conversations and build knowledge about the features of well-designed, discipline-based learning and assessment plans. You will provide a three-to-five-page (double-spaced, 12-point font) critical review of the chosen learning design and assessment plan.

| Criteria | A to A+ Meets all and exceeds some requirements | B+ to A- Meets all requirements | B- to B Meets most requirements | Does not meet requirements |
|---|--|---|---|--|
| Assessment of Learning Plan -addresses the elements of a learning plan as listed in the assignment description | All elements of a learning plan are addressed in a thorough, detailed, and well- supported assessment. | Some elements of a learning plan are addressed in a thorough, detailed, and well- supported assessment. Others require strengthening. | Some elements of a learning plan are addressed, however the assessment is vague and examples are inappropriate, unspecific, or few. | Some of the elements of a learning plan are not addressed at all or are addressed in a cursory manner. |
| Grounding in Theory -makes connections to theories of learning and Programs of Study. Explains these connections. | Makes multiple connections to the literature, including the Program of Study. Theoretical positioning is highly effective, and well-explained. | Makes some connections to the literature, sometimes including the Program of Study. Theoretical positioning is usually effective, and well-explained. Some connections require strengthening. | Makes few connections to the literature, or Program of Study. Theoretical positioning is sometimes inappropriate and under explained. | Connections to theory and/or Program of Study are missing, incomplete, or made in a cursory manner. |

CRITERIA FOR ASSESSMENT OF LEARNING TASK 1



| Presentation of ideas -3-5 pages, double-spaced -academic writing | -Paper is 3-5 pages. -Writing style is academic. In-text citations and reference list use correct APA 7 th edition style. | -Paper is 3-5 pages. -Writing style is primarily academic. Most in-text citations and reference list use correct APA 7 th edition style. | -Paper is 3-5 pages. -Writing style is sometimes academic, sometimes informal. Some in-text citations and reference list use | -Paper is exceeds 5 pages or is less than 3. -Writing style is informal. In-text citations and reference list are missing |
|---|---|--|---|--|
| -academic writing style -APA in-text citations and reference list -attention to form | APA 7 th edition style. Paper demonstrates superior attention to form. | APA 7 th edition style. Paper mostly demonstrates attention to form. | and reference list use correct APA 7 th edition style. Paper requires attention to form. | reference list are missing or not in APA style. Paper requires extensive editing in order to attend to form. |
| (grammar, spelling, etc.) | | | | |

Resources:

Alberta Assessment Consortium (Username: teachers Password: master)

Doucette Library – Library guide for lesson planning: https://library.ucalgary.ca/guides/lesson_planning_resources

2. LEARNING TASK 2: Developing Conceptual Understanding of Math Concepts (Mathematics Knowledge for Teaching) – Due: July 17th through July 21st (sign-up for presentation dates.)

The intent of this learning task is for you to foster a professional conversation and learning experience focused on pedagogical content knowledge within math education. You will select one mathematical concept, for example, solving equations in grade 7 or comparing fractions in grade 3, and delve into how the concept should be taught using the concreteness fading approach. Concreteness fading involves starting with concrete materials (manipulatives), moving to pictorial representation, and then representing the mathematics symbolically. Your presentation should focus on how this approach can be used to effectively teach the chosen mathematical concept to students.

You will present your work as a 45-minute Professional Development workshop for teachers.

-Presentation length: 45 minutes (30 min interactive workshop, 15 min. Q & A)

-Audience: The target audience for the workshop should be math teachers

-Concreteness Fading Approach: The presentation should explain how concreteness fading can be used effectively to teach the chosen mathematical concept and will include a series of math problems/tasks (not lesson plans) that would support each stage of understanding. Participant use of mathematics manipulatives must be included in the concrete tasks.

-Presentation format: Specifics will be at the discretion of the presenters.

-Written component: A brief written component (i.e., speaking notes, PowerPoint presentation, or some other record of the ideas presented) along with references (APA 7th ed.) must be submitted to D2L-Dropbox by 12pm the day of your presentation.



CRITERIA FOR ASSESSMENT OF LEARNING TASK 2

| Criteria | A to A+ Meets all and exceeds some requirements | A- to B+ Meets all requirements | B to B- Meets most requirements. | Does not meet requirements |
|---|---|--|---|---|
| | Conc | creteness Fading Approa | ch | |
| -selects tasks and manipulatives that support the conceptual understanding of the topic | The presentation effectively demonstrates how concreteness fading can be used to teach the chosen mathematical concept, with a clear flow between each stage (concrete, pictorial, symbolic). The math problems/tasks presented effectively support each stage of understanding and include participant use of mathematics manipulatives. | The presentation generally demonstrates how concreteness fading can be used to teach the chosen mathematical concept, with a basic explanation of each stage (concrete, pictorial, symbolic). The math problems/tasks presented somewhat support each stage of understanding and include some participant use of mathematics manipulatives. | The presentation somewhat demonstrates how concreteness fading can be used to teach the chosen mathematical concept, with an incomplete explanation of each stage (concrete, pictorial, symbolic). The math problems/tasks presented somewhat support each stage of understanding and include limited participant use of mathematics manipulatives. | The presentation does not effectively demonstrate how concreteness fading can be used to teach the chosen mathematical concept, with little or no explanation of each stage (concrete, pictorial, symbolic). The math problems/tasks presented do not effectively support each stage of understanding and do not include participant use of mathematics manipulatives. |
| | | Grounding in Theory | | |
| -makes strong connections amongst the tasks, theories of learning, and Program of Study | Makes multiple connections to the literature, including the Program of Study. Relation of theory to practice is highly evident, and well- explained. | Makes some connections to the literature, sometimes including the Program of Study. Relation of theory to practice is somewhat evident, and well- explained. Some connections require strengthening. | Makes few connections to the literature, or Program of Study. Relation of theory to practice is sometimes inappropriate and under explained. | Connections to theory and/or Program of Study are missing, incomplete, or made in a cursory manner. |
| | E | ffectiveness of Presentati | ion | |
| -engages participants in the doing of mathematics, and helps them develop their mathematical knowledge for teaching (MKT) | Presentation is creative, highly engaging, and effective. Presentation flows between tasks and ideas with logical progression. Audience is provided with an effective summary of essential understandings. | Overall presentation is appealing and supports the basic development of conceptual ideas. Presentation generally flows between tasks and ideas with logical progression. Audience is provided with a basic summary of essential understandings. | Presentation is adequate but somewhat limited in the development of conceptual ideas. Presentation is somewhat disjointed and does not adequately assist participant understanding. Summary does not effectively support participants in essential understandings. | The presentation does not have coherent development of conceptual ideas. Presentation requires greater organization and clarity. Audience is not provided with a summary. |



3. LEARNING TASK 3: Creation of Short-term Learning and Assessment Plan – DUE: Wednesday, July 27th

Lesson plans are central to imagine and facilitate meaningful classroom experiences to support students' learning and doing of mathematics and development of mathematical thinking, procedural fluency, and conceptual understanding of mathematics. This assignment allows you to learn how to create such lesson plans by applying your understanding of inquiry-based teaching/learning and MKT for a mathematics concept (from your choice of learning outcomes Kindergarten to Grade 12).

Working individually, you will select a mathematics concept from the Alberta Mathematics Program of Studies (K-12) and design ONE lesson plan for an 80-minute class (for Secondary) or TWO lessons of 35-40 minutes (For Elementary or Junior High). You must plan for learning and assessment that promote mathematical thinking and deep understanding of the concept. Your learning and assessment plan will be submitted using a lesson plan template adapted from Wiggins and McTighe (1998). The template will be provided. In addition to the lesson plan, you will provide rationale for your thinking and decision-making processes relevant to developing the lesson plan. Rationale could include references to the course readings, class discussions, and other sources.

| Criteria | A to A+ Meets all and exceeds some requirements | B+ to A- Meets all requirements | B- to B Meets most requirements | Does not meet requirements |
|---|---|---|--|---|
| DESIGN Curricular Outcomes -links to Program of Study (PoS) | Appropriate links to PoS for chosen level; clear understanding of curricular outcomes as expressed in POS | Some links to PoS for chosen level are clear and appropriate; some PoS curricular outcomes are represented in lesson plan | Links to PoS for chosen level not clear or appropriate; curricular outcomes present but not clearly articulated | Few if any links provided between PoS and lesson elements; curricular outcomes not present |
| INSTRUCTIONAL DELIVERY -plan demonstrates disciplinary knowledge, engagement, student- centeredness, organization, integration across lesson sections | Lesson Plan is well informed by disciplinary knowledge; lesson highly engaging; lesson is clearly student- centered; lesson clear and well-ordered; easy to envision how lesson will unfold; all important elements included; high degree of integration sections and excellent links | Good evidence of carryover of disciplinary knowledge to lesson plan; lesson is some- what engaging mostly student-centered; good attempt to integrate parts of the lesson; lesson plan mostly clear and logical flow; most important elements included | Some evidence that disciplinary knowledge informed creation of lesson plan; lesson is somewhat student- centered but needs to be strengthened; lesson plan flow is neither clear nor logical and is hard to follow; several important elements of good lesson plan are missing | Little evidence that disciplinary knowledge informed creation of plan; lesson is teacher- centered; lesson plan is missing important elements and does not flow well (hard for reader to imagine how the lesson would unfold) |
| DEEP UNDERSTANDING -learning opportunities for deep understanding of curriculum objectives | Lesson design (inquiry tasks) is highly effective for supporting deep/ conceptual understanding of content objectives by students | Lesson design (tasks) provides good opportunities to encourage deep/ conceptual understanding by students | Lesson design (tasks) shows awareness of importance of encouraging deep understanding by students but not effective in achieving that understanding | Absence of evidence of attempt to encourage deep understanding by students |

CRITERIA FOR ASSESSMENT OF LEARNING TASK 3



| ASSESSMENT | Appropriato | Good affort to integrate | Some attempt to include | Assessment lealing: no |
|---------------------|--------------------------|--------------------------|--------------------------|---------------------------|
| ASSESSIVIENI | Appropriate | Good enori to integrate | Some attempt to include | Assessment lacking, no |
| • • | assessments are clearly | appropriate and | appropriate assessment | understanding shown of |
| -integrated | integrated into lesson; | effective assessments; | opportunities; shows | importance of |
| formative | clearly communicates to | Shows some variety in | lack of understanding of | appropriate and |
| assessments | students how individual | choices for formative | what constitutes | effective assessment; |
| -statement of how | tasks fit in. Uses a | assessment – most are | effective assessment; no | clear lack of direction |
| assessment will | variety of effective | effective; clear | communication to | for students. Unclear |
| improve practice | formative assessments | statement of how | students of how to | vision of how to include |
| | to inform instructional | assessments will | situate their work. | assessment; discussion |
| | decisions and to | improve practice | Formative assessment | of importance of |
| | improve practice; strong | | options are limited and | assessment or how it |
| | statement of how | | not effective; does not | can be used to improve |
| | assessment will improve | | address how assessment | practice needs to be |
| | practice | | will lead to improved | strengthened/ revised |
| | 1 | | practice | C |
| RATIONALE | Rationale displays an | Rationale displays a | Rationale displays a | Rationale displays little |
| | excellent understanding | good understanding of | partial understanding of | understanding of the |
| -depth of analysis/ | of the relationships of | the relationships of | the relationships of | relationships of theory |
| understanding | theory to practice. | theory to practice. | theory to practice. | to practice. |
| WRITING QUALITY | The lesson plan and |
| | rationale are clearly | rationale are relatively | rationale are somewhat | rationale are unclearly |
| | written and stand as a | clearly written and | unclearly written and | written and contains |
| | superior example free of | contains few errors. | contains errors that | many errors that impede |
| | errors. | | impede understanding. | understanding. |
| References | Clearly stated; | Stated; APA 7 | Unclear; referenced but | Not stated or unclear; |
| | Accurately APA7 | referenced with minor | not to APA 7 guidelines | not referenced. |
| | referenced | errors | | |

THE EXPECTATION OF EXCELLENCE IN PROFESSIONAL WORK

Please review the Academic Calendar carefully. It describes the program and provides detailed schedules and important dates. It contains information on expectations for student work and professional conduct. In addition, procedures are described regarding concern about student performance in the program. Please pay especially careful attention to details and descriptions in the following topic areas:

• The Importance of Attendance and Participation in Every Class

As this is a professional program, experiences are designed with the expectation that all members will be fully involved in all classes and in all coursework experiences. As you are a member of a learning community your contribution is vital and highly valued, just as it will be when you take on the professional responsibilities of being a teacher. We expect that you will not be absent from class with the exception of documented instances of personal or family illness or for religious requirements.

• Engagement in Class Discussion and Inquiry

Another reason for the importance of attendance and participation in every class is that the course involves working with fellow students to share ideas and thinking. For example, each class you will work with a small group to engage fellow students in discussions on work being considered in class. You will also help other groups by providing ideas for scholarly inquiry in assignments. If you find that you are experiencing difficulties as a group collaborating, please inform the instructor.



EXPECTATIONS FOR WRITING

All written assignments (including, to a lesser extent, written exam responses) will be assessed at least partly on writing skills. Writing skills include not only surface correctness (grammar, punctuation, sentence structure, etc.) but also general clarity and organization. Sources used in research papers must be properly documented. If you need help with your writing, you may use the writing support services in the Learning Commons. For further information, please refer to the official online University of Calgary Calendar, Academic Regulations, E. Course Information, E.2: Writing Across the Curriculum: http://www.ucalgary.ca/pubs/calendar/current/e-2.html

LATE SUBMISSIONS

All late submissions of assignments must be discussed with the instructor **prior to the due date.** Students may be required to provide written documentation of extenuating circumstances (e.g. statutory declaration, doctor's note, note from the University of Calgary Wellness Centre, obituary notice). A deferral of up to 30 days may be granted at the discretion of the Associate Dean of Undergraduate Programs with accompanying written evidence.

ISSUES WITH GROUP TASKS

With respect to group work, if your group is having difficulty collaborating effectively, please contact the instructor immediately. If a group is unable to collaborate effectively or discuss course materials online in a timely manner, the instructor may re-assign members to different groups or assign individual work for completion.

| Grade | GPA Value | % | Description per U of C Calendar |
|-------|------------------|--------------|--|
| A+ | 4.0 | 95-100 | Outstanding |
| А | 4.0 | 90-94 | Excellent – Superior performance showing comprehensive understanding of the subject matter |
| A- | 3.7 | 85-89 | |
| B+ | 3.3 | 80-84 | |
| В | 3.0 | 75-79 | Good - clearly above average performance with knowledge of |
| | | | subject matter generally complete |
| B- | 2.7 | 70-74 | |
| C+ | 2.3 | 65-69 | |
| С | 2.0 | 60-64 | Satisfactory - basic understanding of the subject matter |
| C- | 1.7 | 55-59 | |
| D+ | 1.3 | 52-54 | Minimal pass - Marginal performance |
| D | 1.0 | 50-51 | |
| F | 0.0 | 49 and lower | Fail - Unsatisfactory performance |

GRADING

Students in the B.Ed. program must have an overall GPA of 2.5 in the semester to continue in the program without repeating courses.



Academic Accommodation

Students seeking an accommodation based on disability or medical concerns should contact Student Accessibility Services; SAS will process the request and issue letters of accommodation to instructors. For additional information on support services and accommodations for students with disabilities, visit www.ucalgary.ca/access/. Students who require an accommodation in relation to their coursework based on a protected ground other than disability should communicate this need in writing to their Instructor. The full policy on Student Accommodations is available at http://www.ucalgary.ca/policies/files/policies/student-accommodation-policy.pdf.

Academic Misconduct

For information on academic misconduct and its consequences, please see the University of Calgary Calendar at http://www.ucalgary.ca/pubs/calendar/current/k.html

Attendance/ Prolonged Absence

Students may be asked to provide supporting documentation for an exemption/special request. This may include, but is not limited to, a prolonged absence from a course where participation is required, a missed course assessment, a deferred examination, or an appeal. Students are encouraged to submit documentation that will support their situation. Supporting documentation may be dependent on the reason noted in their personal statement/explanation provided to explain their situation. This could be medical certificate/documentation, references, police reports, invitation letter, third party letter of support or a statutory declaration etc. The decision to provide supporting documentation is at the discretion of the student.

Falsification of any supporting documentation will be taken very seriously and may result in disciplinary action through the Academic Discipline regulations or the Student Non-Academic Misconduct policy.

https://www.ucalgary.ca/pubs/calendar/current/n-1.html

The Freedom of Information Protection of Privacy Act prevents instructors from placing assignments or examinations in a public place for pickup and prevents students from access to exams or assignments other than their own. Therefore, students and instructors may use one of the following options: return/collect assignments during class time or during instructors' office hours, students provide instructors with a self-addressed stamped envelope, or submit/return assignments as electronic files attached to private e-mail messages.

For additional resources including, but not limited to, those aimed at wellness and mental health, student success or to connect with the Student Ombuds Office, please visit <u>https://www.ucalgary.ca/registrar/registration/course-outlines</u>

Education Students Association (ESA) President for the academic year is Claire Gillis, esa@ucalgary.ca.

Werklund SU Representative is Elsa Stokes, educrep@su.ucalgary.ca.