

EDUC 535.07
Specialization II Elementary Mathematics
2020 Fall

Section	Instructor	Time	Location	Email
S01	Brent Davis	9.30–11.00	Zoom & D2L	brent.davis@ucalgary.ca
Course Coordinator: Amy Burns				amburns@ucalgary.ca

Synchronous Meetings: September 14; September 28; October 5; October 26 (all Mondays)

Zoom Location: 998 3786 0802 (Password: 176222)

Office Hours: I will be normally be available for consultation 9.30–11.00, MWF, Sept. 09–Oct. 30.
Please email at least one day ahead to organize a Zoom meeting time.

COURSE DESCRIPTION:

The intent of the Specialization Seminar II is to deepen students' understanding of the practical aspects of teaching within the specialization and to connect this practice with specific theoretical concepts. While this second specialization course focuses more on practical knowledge, students will also refine their knowledge of discourse and theory within the discipline and develop a deeper understanding of ways to enact this theory in a classroom context. Students will additionally become familiar with relevant Ministry documents associated with the Alberta curriculum and draw on practical classroom observation from the field experience to participate in meaningful discussion and to connect these observations with a vision for their own teaching. The emphasis of the course is on designing for student learning (subject-specific; assessment that strengthens student learning and improves instruction; and designing for inclusion, differentiation, and inquiry).

LEARNER OUTCOMES:

Over the course of the semester, students will:

- 1) Further develop a deeper conceptual understanding of the historical, socio-cultural, political contexts of the discipline, and relate this to curriculum planning in the specialization area;
- 2) Identify and critique the key learning perspectives (as outlined in the front matter of the Program of Study) and intentions (learning objectives) across the units in a grade from the Alberta Program of Study;
- 3) Successfully apply theoretical knowledge to the design of a longer-term unit and assessment plan.

READINGS AND RESOURCES:

Websites:

Discourses on Learning in Education. <https://learningdiscourses.com>

Math Minds Online Resource. <https://structuringinquiry.com>

CPD for Mathematics Teachers. <https://www.atm.org.uk/CPD-for-Mathematics-Teachers>

Required Readings:

Davis, B. (2008). Is 1 a prime number? *Mathematics Teaching in the Middle School*, 14(2), 86–91.

<http://www.jstor.org.ezproxy.lib.ucalgary.ca/stable/41182638>

Davis, B. (2015). Exponentiation: A new basic? *Mathematics Teaching in the Middle School*, 21(1), 34–41.

<https://www-jstor-org.ezproxy.lib.ucalgary.ca/stable/10.5951/mathteacmidscho.21.1.0034>

Davis, B. (2020). Number work: Teachers as experts who can think like novices. *For the Learning of Mathematics*, 40(0), 49–54. <https://flm-journal->

[org.ezproxy.lib.ucalgary.ca/Articles/5EA168FDE129BA050C4F1101E1A57F.pdf](http://www-jstor-org.ezproxy.lib.ucalgary.ca/Articles/5EA168FDE129BA050C4F1101E1A57F.pdf)

Hewitt, D. (1999). Arbitrary and necessary, Part 1: A way of viewing the mathematics curriculum. *For the Learning of Mathematics*, 19(3), 2–9. <https://www-jstor-org.ezproxy.lib.ucalgary.ca/stable/40248303>

Skemp, R. (1976). Relational understanding and instrumental understanding. *Mathematics Teaching*, 77, 20–26. Re-published in *Mathematics Teaching in the Middle School*, 12(2), Sep 2006, pp. 88–95: <https://www-istor-org.ezproxy.lib.ucalgary.ca/stable/41182357>

Additional Readings (You may find the following resources helpful as you build your own professional library.)

- Alberta Education Program of Study for Mathematics
<https://www.alberta.ca/programs-of-study.aspx>
- Alberta Education. (2011). English as a Second Language Proficiency Benchmarks.
▪ <http://www.learnalberta.ca/content/eslapb/>
- Alberta Learning. (2010). Making a difference: Meeting diverse learning needs with differentiated instruction.
▪ https://education.alberta.ca/media/384968/makingadifference_2010.pdf
- Small, M. (2015). *Making math meaningful to Canadian students, K–8* (3rd edn.). Toronto, ON: Nelson.
- Van de Walle, J.A., Karp, K.S., Bay-Williams, J.M., & McGarvey, L. M. (2017). *Elementary and middle school mathematics: Teaching developmentally* (5th Canadian edn.) Toronto, ON: Pearson.

COURSE SCHEDULE:

This is the first time that this course has been offered in this format – and so the following schedule should be understood as tentative. Some details likely be adjusted as the term unfolds. Note that ...

- **Synchronous sessions** are highlighted in green.
- **Due dates of learning tasks** are highlighted in purple.
- **Elaborated descriptions** of sessions and activities will be posted on D2L as the course unfolds.

SESSION	DATE	ACTIVITIES	DUE
1	Sep 09	Cognitive Sciences and School Mathematics	<ul style="list-style-type: none"> • Register at https://www.structuringinquiry.com • Complete Unit 1, Session 1 • Engage with D2L Discussion prompts
2	Sep 11	Ribboned Lessons versus Blocked Lessons	<ul style="list-style-type: none"> • Complete structuringinquiry.com, Session 1.2 • Engage with D2L Discussion prompts
3	Sep 14	Synchronous Session <ul style="list-style-type: none"> • Introductions and overviews • Discussion of Task 1 • Arbitrary and Necessary • The “Math Wars” 	<ul style="list-style-type: none"> • Post a brief Self-Introduction in the appropriate D2L file before the session • Pre-read Hewitt (1999)
4	Sep 16	Ravel versus Trajectory	<ul style="list-style-type: none"> • Complete structuringinquiry.com, Session 1.3 • Engage with D2L Discussion prompts
5	Sep 18	Prompting Learner Attentions	<ul style="list-style-type: none"> • Complete structuringinquiry.com, Session 1.4 • Engage with D2L Discussion prompts
6	Sep 21	Listening to Learners	<ul style="list-style-type: none"> • Complete structuringinquiry.com, Session 1.5 • Engage with D2L Discussion prompts
7	Sep 23	Peer review and critique of preliminary drafts of Task 1	<ul style="list-style-type: none"> • Post preliminary version of your Task 1 by 9:30 am • Provide feedback on peer postings
8	Sep 25	Complete and submit Task 1	<ul style="list-style-type: none"> • Assignments must be submitted to the appropriate Dropbox by 11:00 am. (It will be closed after that.)
9	Sep 28	Synchronous Session <ul style="list-style-type: none"> • Procedural vs. Conceptual • Instantiations of Number • When/How to Introduce Symbols 	<ul style="list-style-type: none"> • Pre-read Skemp (1976) • Pre-read Davis (2020)
10	Sep 30	Base-10 Blocks, Part 1	<ul style="list-style-type: none"> • Engage with online resources to learn about and frame your practice of using Base-10 Blocks to represent multidigit numbers, add them, and subtract them • Comment on your experiences in the appropriate D2L Discussion thread
11	Oct 02	Base-10 Blocks, Part 2	<ul style="list-style-type: none"> • Continue your work with Base-10 Blocks for

			<ul style="list-style-type: none"> multiplication and division of multidigit whole numbers and for the basic operations on decimal fractions • Comment on your experiences in the appropriate D2L Discussion thread
12	Oct 05	Synchronous Session <ul style="list-style-type: none"> • Number Lines • Coding and Early Mathematics • Decimal Fractions • Concept Study 	<ul style="list-style-type: none"> • Pre-read Davis (2008) • Pre-view “Computational thinking and experiences of arithmetic concepts”: http://mkn-rcm.ca/online-seminar-series-on-programming-in-mathematics-education/
13	Oct 07	Concept Study – Part 1: Even Numbers	<ul style="list-style-type: none"> • Engage in a concept study of even numbers • Post your concept study results by 11:00 am • Engage with one another’s findings
14	Oct 09	Concept Study – Part 2: Multiplication	<ul style="list-style-type: none"> • Read Davis (2015) • Engage in a concept study of multiplication • Post your concept study results by 11:00 am • Engage with one another’s findings
15	Oct 14	Common Fractions – Part 1: Folding Fractions	<ul style="list-style-type: none"> • Work through the tasks posted for this session • Develop and post additional tasks • Discuss activity in appropriate D2L thread
16	Oct 16	Common Fractions – Part 2: Fraction Kits	<ul style="list-style-type: none"> • Work through the tasks posted for this session • Develop and post additional tasks • Discuss activity in appropriate D2L thread
17	Oct 19	Peer review and critique of preliminary drafts of Task 2	<ul style="list-style-type: none"> • Post preliminary version of your Task 2 by 9:30 am • Provide feedback on peer postings
18	Oct 21	Complete and submit Task 2	<ul style="list-style-type: none"> • Assignments must be submitted to the appropriate Dropbox by 11:00 am and posted to the Discussion.
19	Oct 23	Unit Planning	<ul style="list-style-type: none"> • Online discussion and feedback associated with lesson planning
20	Oct 26	Ongoing Professional Learning <ul style="list-style-type: none"> • Expectations • CPB for Mathematics Teachers 	<ul style="list-style-type: none"> • Visit https://www.atm.org.uk/CPD-for-Mathematics-Teachers, and view the videos specified in the daily update on D2L.
21	Oct 28	Sharing Learnings	<ul style="list-style-type: none"> • Select and post a review of a “CPB for Mathematics Teachers” video • Discuss one another’s postings
22	Oct 30	Shared Learnings	<ul style="list-style-type: none"> • Find and post a review of a website intended to support mathematics teachers’ professional learning • Discuss one another’s postings • Submit your Task 3 portfolio to the D2L Dropbox

LEARNING TASKS OVERVIEW:

TASK	DESCRIPTION OF LEARNING TASK	% OF GRADE	DUE DATE
1	Teaching Resources	40%	noon , September 25
2	Unit and Assessment Plan	40%	noon , October 21
3	Engaging the Collective	20%	noon , October 30

Final course grades will be a summed total of grades received on in each of the categories noted above. Preliminary details on each of the tasks are provided below. **Elaborated details** will be posted on D2L.

Note that Tasks 1 and 2 are well suited for your e-portfolios. It is strongly recommended that you undertake those tasks with a view toward using them to represent your emerging professional identity.

1. Teaching Resources (40%; Friday, September 25)

For this assignment, you will work in a group to source, critique, and post (onto D2L) TWO teaching ideas to demonstrate your understanding of principles of sound resources for elementary school mathematics.

- **Group:** You are required to work in a group on this task, mainly to ensure opportunity to discuss class material with one another. Groups will comprise 3–4 people. An opportunity for self-selection will be provided, and those who have not found or formed groups on their own by **Tuesday, September 15** will be assigned to a group. Group memberships will be posted.
- **Principles of sound resources:** Because we are not able to meet in person to discuss, analyze, and situate principles of resource development that are grounded in current cognitive science research, we will rely on the principles developed in Unit 1 of the StructuringInquiry.com website. Several principles are developed on the site, and you are expected to select two or three that will serve to focus your analyses.
- **Sourcing the resources:** Any resources intended to be used to support elementary mathematics teaching may be used – online or print resources, online lessons, etc. You will select TWO resources, ONE that you feel exemplifies the principles under consideration, and ONE that falls short.
- **Critiques:** For each selected resource, you'll create an up-to-5-page/slide presentation. On p. 1, you will introduce the resource. On the final page, you will summarize your impressions and conclusions. On the remaining page(s), you will present and explain your analyses and interpretations.

Please be attentive to the timing of the following elements of the task:

- **Post on D2L:** Your critiques should be saved as PDF files. They will be posted TWICE on D2L – first by 9:30 am on **Wednesday, September 23**, for peer review and critique.
- **Final version:** Completed tasks should be submitted to the appropriate D2L Dropbox by noon on **Friday, September 25**.
- **Engaging the Collective:** While I will not be considering your online engagement with your peers' first drafts of their work (posted on **Wednesday, September 23**) in the grading of your Task 1, please be aware that I will be monitoring that Discussion and considering your contributions toward the grade associated with Task 3, "Engaging the Collective."

Criteria for assessment of this task will include:

- Demonstrated understanding of principles of sound resources, based on the suitability of the principles you choose to focus your analysis and the appropriateness of your critiques oriented by those principles;
- Depth of insight, based on the quality, defensibility, and incisiveness of your assessments and conclusions;
- Quality of presentation, based on the sufficiency of information provided, clarity of discussion, etc.

2. Unit and Assessment Plan (40%; **Wednesday, October 21**)

The fine-grained details of this task will be developed and posted as the term progresses. In broad brushstrokes, for this task you will work independently to develop a brief unit (i.e., 3 to 4 lessons) focused on a single mathematical concept. The following elements will serve both as guidelines for the development of your unit and as criteria for assessment:

- Informed by disciplinary knowledge/Programs of Study (making meaningful connections to ways of thinking about the discipline, and in alignment with the Program of Study)
- Informed by cognitive science (lessons are designed according to evidence-based principles of both how humans learn and how mathematics is structured)
- Immediate, continuous assessment (pedagogy is organized in a manner that assures feedback from all learners in relation to each critical discernment in a lesson)

Please be attentive to the timing of the following elements of the task:

- Register your choice for topic with the instructor by **Friday, October 02**. (This check-in is necessary to ensure that you've selected a suitably "sized" topic that isn't already a focus of analysis within the course.)
- Post a preliminary draft on D2L: Preliminary drafts of your units should be posted TWICE on D2L by 9:30 am on **Monday, October 19** for peer review and critique.
- Final version: Completed tasks should be submitted to the appropriate D2L Dropbox by **Wednesday, October 21**.
- **Engaging the Collective:** While I will not be considering your online engagement with your peers' first drafts of their work (posted on **Monday, October 19**) in the grading of your Task 2, please be aware that I will be monitoring that Discussion and considering your contributions toward the grade associated with Task 3, "Engaging the Collective."

3. Engaging the Collective (20%; **Friday, Oct 30**)

Since collaboration with peers will be an important part of our activities, engagement features as an element of the assessment for this course. Informally, I will be monitoring your contributions to your peers' learning throughout the term. The formal part of this assignment, due on **Friday, October 30**, will be a self-assessment portfolio documenting the ways in which you have engaged our collective over the semester. I will be looking for documentation of active student engagement in our activities; however, I will be careful *not* to equate engagement with quantity of verbal or posted contributions. There are many ways in which you can demonstrate your engagement and we will discuss these as we proceed. The following is a partial list of criteria that I will use in my assessment:

- Sharing links to relevant resources
- Posting thoughtful questions, comments, and responses online
- Constructive critique
- Contributing in discussions
- Asking thoughtful questions
- Sharing relevant personal experiences
- Taking risks in your learning
- Offering a counterargument
- Bringing relevant media reports to our attention.

DETERMINING FINAL GRADES

For the purposes of calculating final marks and converting to course grades, fractional components of numeric totals will not be considered (e.g., sums of 74.25%, 74.5%, and 74.75% will all be truncated to 74%).

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

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.

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

ADDITIONAL INFORMATION

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 that best suits the situation 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
<https://www.ucalgary.ca/registrar/registration/course-outlines>

Education Students Association (ESA) President for the academic year is Jonah Secreti,
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Werklund SU Representative is Naomi Shaw, educrep@su.ucalgary.ca.