

Course Syllabus **MATH 406 | Algebra for Teachers****General Information**

Class Time: M/T/Th, 11am -- 11⁵⁰am

Modality: Hybrid (3 credits in person, 1 credit asynchronous online)

In-Person Location: Samuelson 115

Instructor: Dr. Emilie Hancock (Please refer to me as Emilie or Dr. Hancock)

Office: Samuelson 218C | **Email:** emilie.hancock@cwu.edu | **Phone:** 509.963.2402

Office Hours: M 1-3pm in **DISCOVERY 301** (no appointment necessary). If needed, you can also [schedule an individual appointment](https://outlook.office365.com/owa/calendar/DrHancock@cwuwildcat.onmicrosoft.com/bookings/) (<https://outlook.office365.com/owa/calendar/DrHancock@cwuwildcat.onmicrosoft.com/bookings/>) outside of office hours.

Materials

- **Canvas Access**
- **Textbooks:** NOT REQUIRED
 - Beckmann, S. *Mathematics for elementary teachers with activity manual*. Pearson.
 - Driscoll, M. (1999). *Fostering Algebraic Thinking: A Guide for Teachers, Grades 6-10*. Heinemann.

Disability Support Services

Central Washington University is committed to creating a learning environment that meets the needs of its diverse student body. [Disability Services](https://www.cwu.edu/disability-services/) (<https://www.cwu.edu/disability-services/>) serves students with permanent and temporary disabilities attending Central on the Ellensburg campus, online or at any of our eight University Centers. Their mission is to make university life accessible to students with disabilities. They work individually with students identifying barriers, and providing accommodations to ensure equal access. Students with disabilities should contact Disability Services to discuss a range of options to removing barriers, including accommodations: Hogue Hall 126, 509.963.2214, DS@cwu.edu. (<mailto:DS@cwu.edu>).

Course Overview and Outcomes

Reflecting [Washington State mathematics K-12 learning standards](https://www.k12.wa.us/student-success/resources-subject-area/mathematics/mathematics-k%E2%80%9312-learning-standards/) (<https://www.k12.wa.us/student-success/resources-subject-area/mathematics/mathematics-k%E2%80%9312-learning-standards/>), the [National Council of Teachers of Mathematics \(NCTM\) principles and standards](https://www.nctm.org/Standards-and-Positions/Principles-and-Standards/) (<https://www.nctm.org/Standards-and-Positions/Principles-and-Standards/>), and the State of Washington Professional Educator Standards Board (PESB) endorsement standards for [Middle-Level Algebra and Functions](https://www.pesb.wa.gov/preparation-programs/standards/endorsement-competencies/middle-level-mathematics/) (<https://www.pesb.wa.gov/preparation-programs/standards/endorsement-competencies/middle-level-mathematics/>) and [Secondary Algebra and Functions](https://www.pesb.wa.gov/preparation-programs/standards/endorsement-competencies/mathematics/) (<https://www.pesb.wa.gov/preparation-programs/standards/endorsement-competencies/mathematics/>), this course emphasizes the conceptual development of algebra and associated procedures. Additional focus is placed on fostering algebraic thinking through the development of algebraic habits of mind. Mathematics content is rediscovered through problem solving¹ and mathematical modeling in an inquiry-based learning² context to support the development of mathematical [processes](https://www.nctm.org/Standards-and-Positions/Principles-and-Standards/Process/) (<https://www.nctm.org/Standards-and-Positions/Principles-and-Standards/Process/>) and [practices](http://www.corestandards.org/Math/Practice/) (<http://www.corestandards.org/Math/Practice/>).

Major content topics of the course include algebraic reasoning; interpreting the structure of expressions and rewriting expressions in equivalent forms; solving equations and inequalities using properties of equality and the concept of logical equivalence; and patterns, sequences, and functions. Connections will be made to elementary and high school mathematics concepts along relevant, standards-based learning progressions (e.g., elementary numbers and operations, solving systems of equations and inequalities, and polynomial algebra). Exploration of these topics will follow the outline:

Unit 1: Patterns, Expressions, and Variables

Unit 2: Equality, Equations, and Inequalities

Unit 3: Representing and Analyzing Functions

Upon successful completion of this [course \(http://catalog.acalog.cwu.edu/\)](http://catalog.acalog.cwu.edu/), you will be able to:

- Reason using the language and structure of algebra to investigate, represent and solve problems including using algebraic expressions, equations, inequalities and systems of equations and inequalities.
- Analyze, extend and generalize sequences, including arithmetic and geometric sequences, both geometrically and algebraically. Write both explicit and recursive definitions for generating a sequence.
- Examine and reason about functional relationships between various representations including graphs, tables, expressions, concrete models and context.
- Use and explain the patterns of change in proportional, linear, inversely proportional, quadratic and exponential functions and the types of real-world relationships these functions can model.
- Use appropriate technology to investigate and represent concepts, methods and application of mathematical concepts.
- Use principles of mathematical thinking and problem solving to explore, solve, generalize and prove mathematical problems.

Grading Scale and Method of Evaluation

Final letter grades will be determined based on your weighted percent grade, rounded to the nearest whole percent.

Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	F
Percent	93-100	90-92	87-89	83-86	80-82	77-79	73-76	70-72	67-69	60-66	0-59

Overall grades will be determined as a weighted average:

20% Standards-Based, Skills Mastery Quizzes

30% Mathematical Reasoning Portfolio

40% Problem Solving Working Group

10% Attendance and Professional Participation

These evaluation categories are intended to cover the spectrum of lower- and higher-levels of [cognitive demand for mathematical tasks](#).³

Skills Mastery Quizzes

Anticipated Time: 1 hour/week (out of class) + time for retakes, as needed

Skills Mastery Quizzes are focused on the lower-level demands of *memorization* and *procedures without connections*. By the end of this course, you should be proficient working with definitions, constructing a variety of visual representations, and performing common calculation methods.

Mathematical Reasoning Portfolio

Anticipated Time: 2-4 hours/week (1-2 hours/week in class, 1-2 hours/week out of class)

The Mathematical Reasoning Portfolio targets the higher-level cognitive demand of *procedures with connections*. You will critique mathematical reasoning to investigate common errors and misconceptions in order to deepen your understanding of key concepts and principles. At the end of this course, you should be able to explain *why* an erroneous method is incorrect, instead of just saying "you can't do it that way."

You will also examine calculation methods that are nonstandard but nevertheless correct. When explaining why nonstandard methods are correct, you have further opportunities to draw on key concepts and principles and to see how these concepts and principles underlie calculation methods. By examining nonstandard methods, you also learn there can be more than one correct way to solve a problem. At the end of this course, you should understand that valid reasoning, not convention or authority, determines whether a method is correct. Moreover, you will be better prepared to value your students' creative mathematical activity.

Problem-Solving Working Groups

Anticipated Time: 3-4 hours/week (1 hour/week in class, 2-3 hours/week out of class)

Problem-Solving Working Groups are designed to provide you opportunities to engage with and facilitate higher-level, cognitively demanding *doing mathematics* tasks, where the key mathematical ideas of the problem are directly related to course content. Integrating content and problem solving⁴ will help you (1) deepen your mathematical content knowledge of the current unit, (2) develop your problem-solving skills, and (3) increase your

awareness of your problem-solving process and the habits of mind you employ. All of these skills are necessary if you will be teaching mathematical problem solving in the future.

Severe or repeated lapses in professional judgment that negatively impact your working group's ability to function successfully may result in disciplinary action up to and including failing the course. You can help your group work effectively by:

- Arriving to meetings on time and staying for the entire session.
- Coming to sessions prepared by completing any pre-session assignments (when applicable)
- Bringing a positive and energetic attitude.
- Focusing on learning by being an active participant:
 - Ask questions, communicate your understanding to your group mates, and complete the assigned tasks.
 - Respect everyone, treat each other with dignity, and encourage all to participate.
 - Limit side activities and put away cell phones.

Attendance and Professional Participation

Attend every class and complete pre-class assignments.

Attendance is required for all class meetings and is included as part of your course grade.

University Policy [CWUP 5-90-040\(38\)](http://www.cwu.edu/resources-reports/cwup-5-90-040-academic-and-general-regulations#Class%20Attendance%20and%20Participation) (<http://www.cwu.edu/resources-reports/cwup-5-90-040-academic-and-general-regulations#Class%20Attendance%20and%20Participation>) provides for reasonable accommodation of student absences for religious holidays in accordance with [RCW 28B.137.010](https://apps.leg.wa.gov/rcw/default.aspx?cite=28B.137.010) (<https://apps.leg.wa.gov/rcw/default.aspx?cite=28B.137.010>). Students seeking reasonable accommodations under this policy must provide written notice to their instructors within the first two weeks of class specifying the dates for which religious accommodations are requested. Contact the Dean of Student Success at (509) 963-1515 for further information.

What if I have to Miss Class?

- Communicate with me as soon as possible. If you are not in communication with me, I will immediately reach out to the [Office of the Dean of Student Success](https://www.cwu.edu/student-success/) (<https://www.cwu.edu/student-success/>).
- Communicate with your group as soon as possible. Find out what you missed and determine how you will catch up.

Course Expectations

As a member of a peer learning community, a high degree of professionalism is necessary. CWU expects every member of the university community to contribute to an inclusive and respectful culture for all in its classrooms, work environments, and at campus events.

Intended Norms for Professional Participation⁵

Move Up/Move Back. Share air time equitably. Know yourself, balance your listening and talking.

Use Evidence to Support your Claims. Back what you have to say with data, readings, etc.

Speak Honestly. All perspectives are valued, and all perspectives are partial.

Value Differences. Remember that your perspective is not the only one.

Discomfort is OK. Identify your learning edge and push it. Take risks, make mistakes.

Make sure everyone feels safe. Safe is not the same as comfortable.

Own your impact. Your intentions may not be the same as your impact.

Anonymity. What's said (and by who) stays, what's learned can leave.

We're all in this together.

Attendance Policy

Attendance is required for all class meetings and is included as part of your course grade.

University Policy [CWUP 5-90-040\(38\)](http://www.cwu.edu/resources-reports/cwup-5-90-040-academic-and-general-regulations#Class%20Attendance%20and%20Participation) (<http://www.cwu.edu/resources-reports/cwup-5-90-040-academic-and-general-regulations#Class%20Attendance%20and%20Participation>) provides for reasonable accommodation of student absences for religious holidays in accordance with [RCW 28B.137.010](https://apps.leg.wa.gov/rcw/default.aspx?cite=28B.137.010) (<https://apps.leg.wa.gov/rcw/default.aspx?cite=28B.137.010>). Students seeking reasonable accommodations under this policy must provide written notice to their instructors within the first two weeks of class specifying the dates for which religious accommodations are requested. Contact the Dean of Student Success at (509) 963-1515 for further information.

Academic Honesty and Student Conduct

Consult university policies [CWUP 5-90-040\(25\)](http://www.cwu.edu/resources-reports/cwup-5-90-040-academic-and-general-regulations#Class%20Attendance%20and%20Participation) (<http://www.cwu.edu/resources-reports/cwup-5-90-040-academic-and-general-regulations#Class%20Attendance%20and%20Participation>), [CWUR 2-90-040\(24\)](http://www.cwu.edu/resources-reports/cwur-2-90-040-academic-and-general-regulations#Academic%20Dishonesty) (<http://www.cwu.edu/resources-reports/cwur-2-90-040-academic-and-general-regulations#Academic%20Dishonesty>), and [WAC 106-125-020](https://apps.leg.wa.gov/WAC/default.aspx?cite=106-125-020) (<https://apps.leg.wa.gov/WAC/default.aspx?cite=106-125-020>) for student conduct, cheating, plagiarism, and other academic expectations. CWU's policies and recommendations for academic misconduct will be followed, leading to disciplinary action up to and including failing the course.

Central Washington University is committed to providing all community members with a learning and work environment that is free from sexual harassment and assault. Students have options for getting help if they have experienced sexual assault, relationship violence, and sexual harassment, or stalking. Information can be found at <http://www.cwu.edu/wecare> (<http://www.cwu.edu/wecare>) and in [CWUP 2-35-050](http://www.cwu.edu/resources-reports/cwup-2-35-050) (<http://www.cwu.edu/resources-reports/cwup-2-35-050>): Sexual Harassment. Faculty are required to report information regarding sexual misconduct or related crimes. Students may speak to someone confidentially by contacting the CWU Wellness Center, 509-963-3213, or the CWU Student Counseling Clinic, 509-963-1391.

Schedule of Course Topics

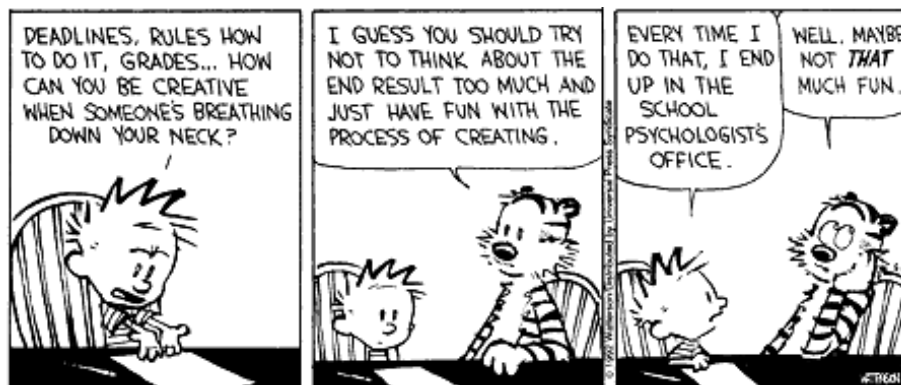
Week	Monday (Problem Launch, Working Groups)	Tuesday (Math Reasoning)	Wednesday (Skills Mastery, Asynchronous Day)	Thursday (Reflect and Wrap Up)	
1 (Jan 5)				Course Introduction and Logistics	
UN I T 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000	2 (Jan 9-13)	Problem 1	Beckmann Section 9.1 Portfolio Assignment 1	Skills Mastery Quiz 1	Beckmann Section 9.1
3 (Jan 16-20)	No Class Meeting Problem 2 Available	Beckmann Section 7.6 Portfolio Assignment 2	Skills Mastery Quiz 2	Beckmann Section 7.6	
4 (Jan 23-27)	Problem 3	Beckmann Section 9.2 Portfolio Assignment 3	Skills Mastery Quiz 3	Beckmann Section 9.2	
5 (Jan 30-Feb 3)	Problem 4	Beckmann Section 9.3, Inequalities Portfolio Assignment 4	Skills Mastery Quiz 4	Beckmann Section 9.4	
6 (Feb 6-10)	Problem 5	Systems of Equations Portfolio Assignment 5	Skills Mastery Quiz 5	Systems of Inequalities	

U N I T 3	7 (Feb 5-11)	Problem 6	Beckmann Section 9.5 Portfolio Assignment 6	Skills Mastery Quiz 6	Beckmann Section 9.5
	8 (Feb 20-24)	No Class Meeting Problem 7 Available	Beckmann Section 9.6 Portfolio Assignment 7	Skills Mastery Quiz 7	No Class Meeting Attend Education Career Fair (https://cwu-csm.symplicity.com/events/c539cd67ead98b19c2459f6b038385f6/overview)
	9 (Feb 27-Mar 3)	Problem 8	Beckmann Section 9.7 Portfolio Assignment 8	Skills Mastery Quiz 8	Beckmann Section 9.7
	10 (Mar 6-10)	Problem 9	Beckmann Section 9.7 Portfolio Assignment 9	Skills Mastery Quiz 9	Beckmann Section 9.7
Finals Week	Final Presentations (Working Groups)				

Assignment deadlines available in Canvas.

Changes

I reserve the right to amend, adjust, or otherwise modify the syllabus at any time during the course.



References

- Stein, M. K., Boaler, J. & Silver, E. A. (2003). Teaching mathematics through problem solving: Research perspectives. In H. L. Schoen & R. I. Charles (Eds.), Teaching mathematics through problem solving: Grades 6-12 (pp. 245–256). Reston, VA: National Council of Teachers of Mathematics.
- Ernst, D. C., Hodge, A., & Yoshinobu, S. 2017. Inquiry-based learning. Notices of the AMS, 64(6), p. 570-574.
- Smith, M. S., and M. K. Stein. Selecting and Creating Mathematical Tasks: From Research to Practice. Mathematics Teaching in the Middle School, 3(February 1998): 344–50.
- Cai, J., & Lester, F. (2010). Why is teaching with problem solving important to student learning. National council of teachers of mathematics, 13(12), 1-6.
- Adapted from [Rifkin \(2020\)](https://www.nsta.org/science-teacher/science-teacher-julyaugust-2020/who-does-science). (<https://www.nsta.org/science-teacher/science-teacher-julyaugust-2020/who-does-science>)