FORMAT 1

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See http://www.uaf.edu/uafgov/faculty-senate/curriculum/course-degree-procedures-/ for a complete description of the rules governing curriculum & course changes.

TRIAL COURSE OR NEW COURSE PROPOSAL

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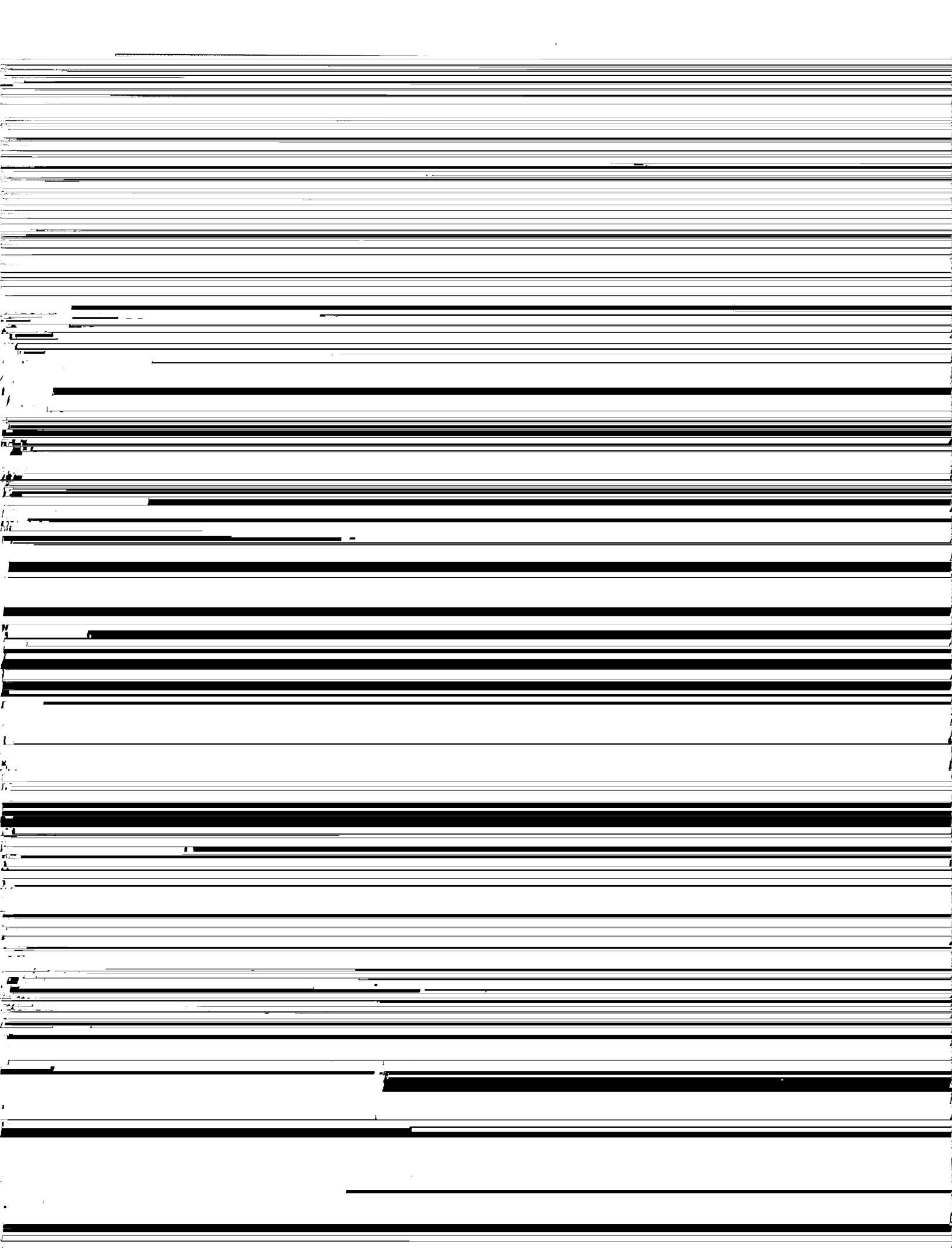

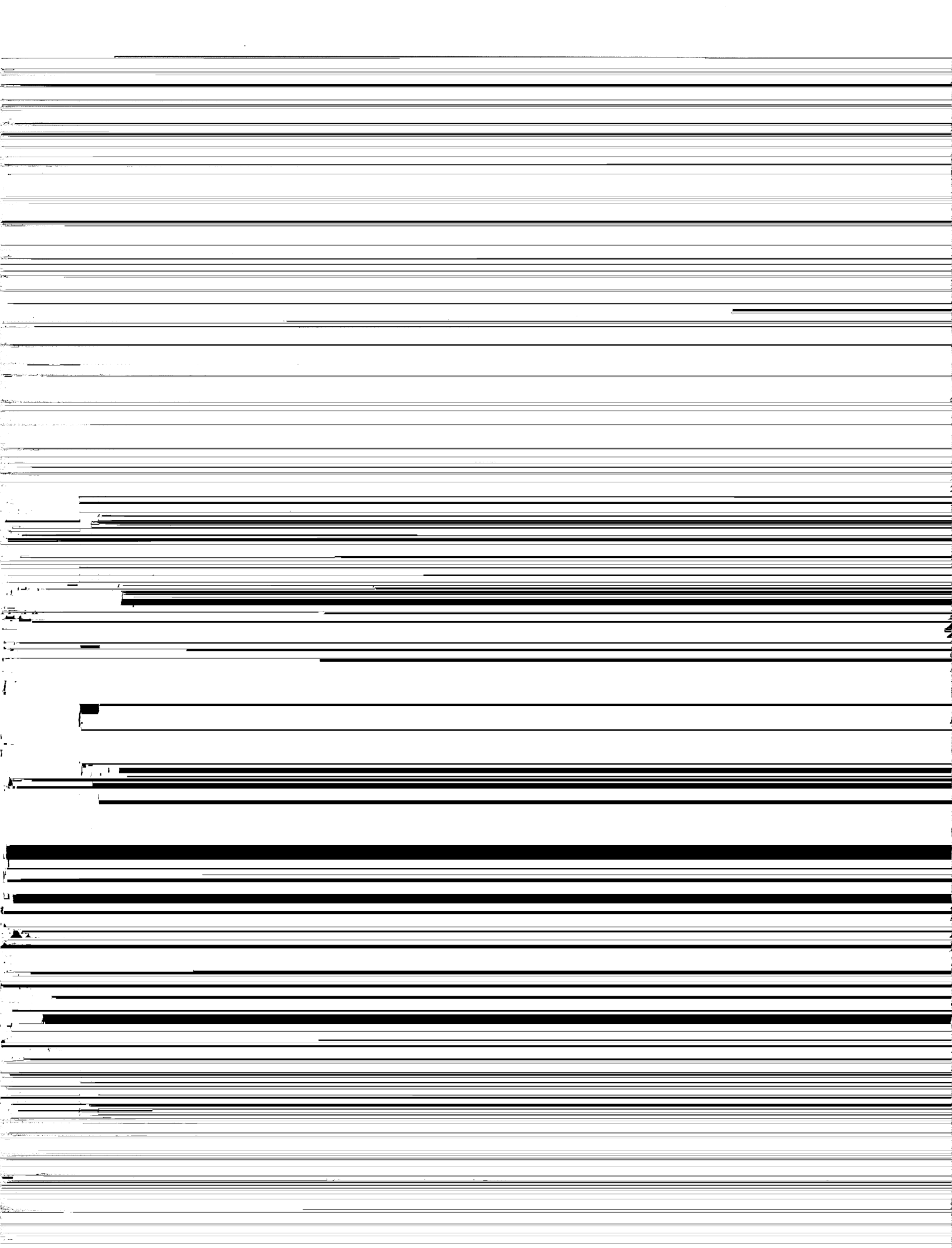

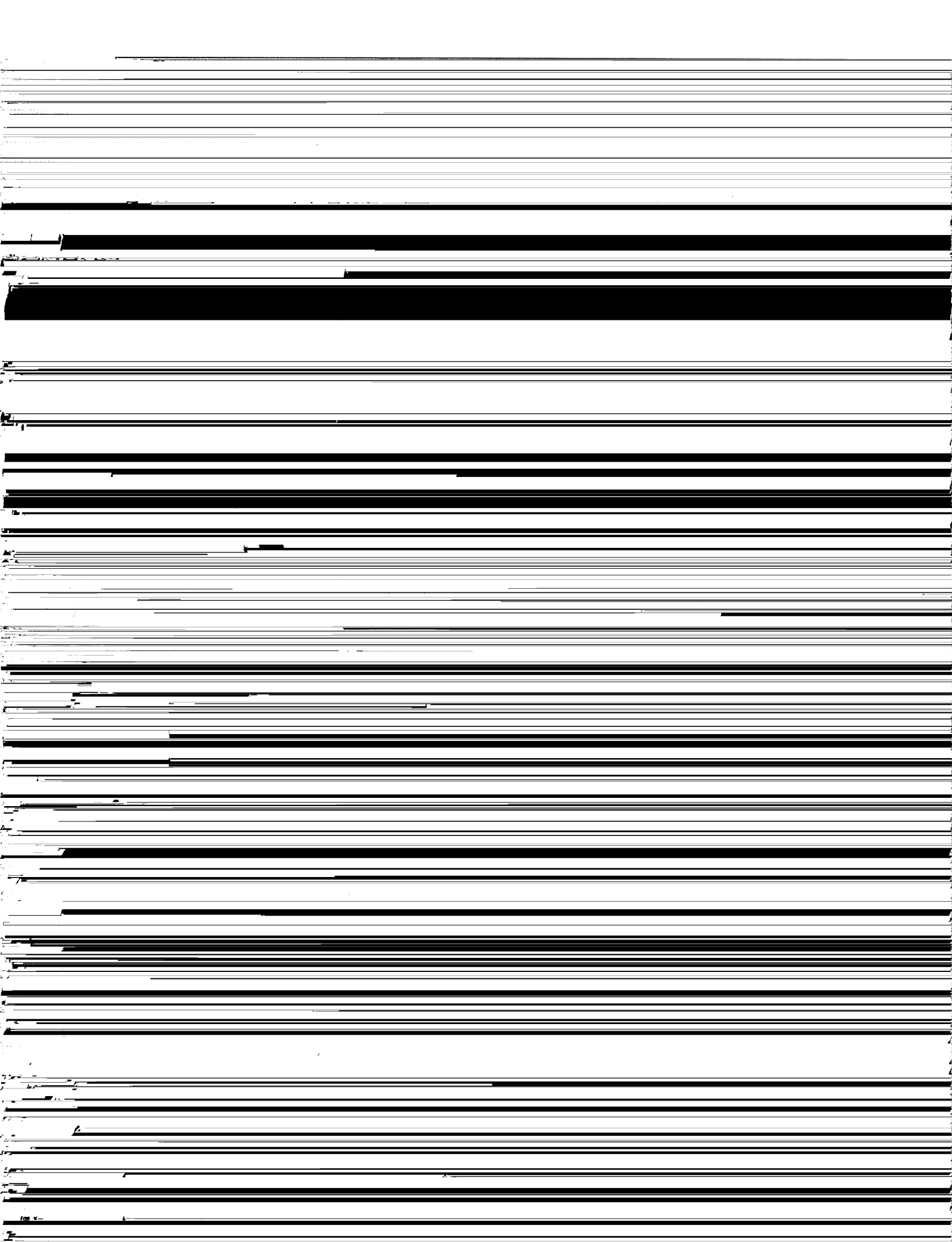

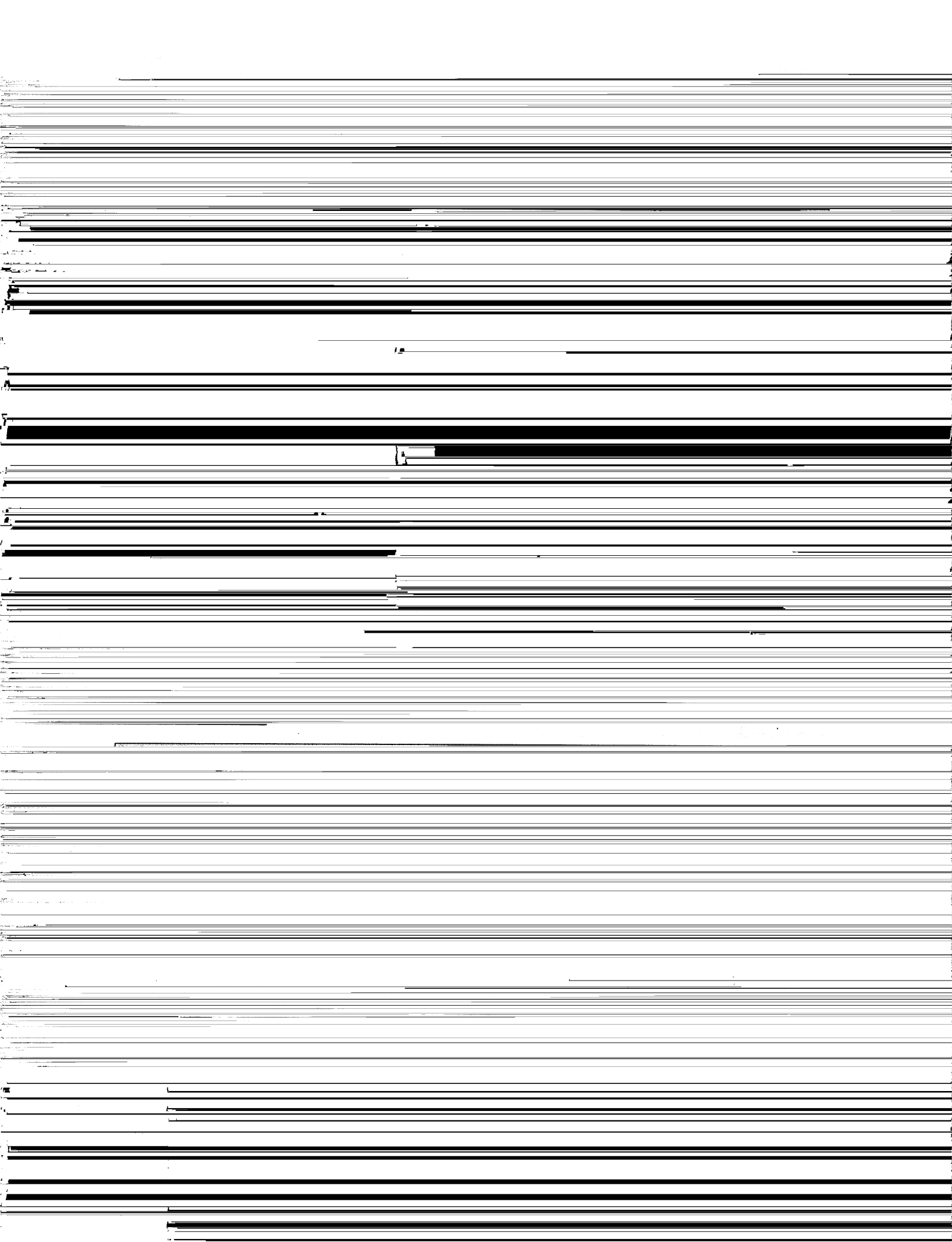

8. Course calendar:

θ A schedule of class topics and assignments must be included. Be specific so that it is clear that the

MATH 6XX: Topics in Geometry (Configurations) Fall 2014

Instructor: Dr. Leah Berman

Office: Chapman 303A

Office Phone: 907-474-7123

Cell Phone: 907-347-4021 (don't call after 9 PM)

e-mail: lwberman@alaska.edu (best way to contact me!)

AIM screen name: leahwrenn

Classroom and class meeting times: Reichardt 165, MWF, 10:30 – 11:30 AM.

Office hours: MWF 2–3 PM, Th 10 – 11AM, and by appointment. To make an appointment, just drop me an e-mail. You are also welcome to stop by my office at any time and see if I am free

Exams: There will be two take-home exams. These are tentatively scheduled for Friday October 8 and Friday November 12. There will be a final project due by NOON on Wednesday December 15.

Tentative schedule: (probably subject to change almost immediately)

Weeks	Chapter in the text
1 –2	1
3–4	2
5–9	3
10–13	4–5

Course Policies:

e-mail: *You are responsible for checking your* `alaska.edu` *e-mail account every day before class.* This is the e-mail address I have access to, and this is what I will use to get in touch with you. If you don't typically check it, then set it up to forward to your main account.

Course Description

An area of beautiful 19th and 20th century mathematics concerns the interplay of analysis and topology on manifolds. A rigorous study of these topics requires many years of graduate study. In this course, we look at these ideas in the context of two-dimensional manifolds (i.e. surfaces). Many of these ideas are most clearly seen in this context and can be presented without a lot of machinery. We'll study the classification of compact surfaces, elementary aspects of algebraic topology (Betti numbers of surfaces, the Brower fixed point theorem, the Jordan curve theorem), a little Morse theory, Riemanninan metrics and the Gauss-Bonnet theorem, and the Poincaré-Hopf index theorem.

Essential Information

Professor	David Maxwell
Office	Chapman 308C
Email	damaxwell@alaska.edu
Phone	474-1196
Web	http://www.math.uaf.edu/~maxwell
Required Text	**Lectures on Surfaces: (almost) everything you wanted to know about them**, *A. B. Katok and V. Climenhaga*, AMS Press

Prerequisites:

Graduate standing **or** permission of instructor.

Class Time

There will be three hours of class lecture each week:

Lecture Times	
MWF	1:00–2:00

Office Hours

Homework Solutions

In an exercise in collaborative mathematics, the class will create solutions for each week's homework. The hope here is that the process of creating the solutions will make the solutions themselves more valuable. Here are the ground rules:

1. Students can expect to contribute a solution at a rate of about one a week. I will occasionally write solutions to harder problems.

2. Solutions must be written in LaTeX. Diagrams can be hand-written and scanned or electronically generated.

3. I will assign problems to students in a pseudo-random fashion. That is, I'll try to assign them randomly, but I'll also keep an eye out to ensure that you don't get a hard problem twice in a row.

4. Submit your solutions (by email) to me by the evening before the assignment's due date. I'll review your work and ask for changes if need be.

5. At least once during the semester, your solution must include a (non-handwritten) diagram. The diagram must include both a picture of some kind, as well as mathematical text.

Evaluation

Course grades will be determined as follows:

Homework	40%
Project	10%
Midterm	25%
Final	25%

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also reserve the right to lower the thresholds.

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A-	90–92%	C-	70–72%
B+	87–89%	D+	67–69%
B	80–86%	D	63–66%
B-	not given%	D-	60–62%

Tentative Schedule

Rules and Policies

Collaboration

You are encouraged to work together in solving homework problems. But each student must write up his or her own solutions independently. If you receive significant help solving a problem, it is customary to make a note in your homework to give the person who helped

Makeup Exams

You can make up an exam if certain extenuating circumstances prevent you from taking it and if you inform me in advance. Contact me as soon as possible if you are going to miss an exam.

Attendance

Attendance is not included directly as part of your grade.

Cell Phones

Turn off your cell phone before you come to class.

Disabilities Services

Math F665 – Configurations Fall 2010

Homework Set 5

Instructions:

- Please include the question statement in your writeup. Your homework should be prepared using LaTeX. Your solutions should be written using grammatically correct, complete sentences.
- Diagrams may be prepared using your software of choice. I suggest using *The Geometer's*

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which can convert to PDF, which you can then include in your file. If you're really hard up, you may leave space in your file and draw by hand, but such diagrams must be made with rulers, etc. I advise the computer.

1. Briefly summarize the article, in a paragraph or two.

   Strive for conciseness, while still hitting all the salient details. Do not just rewrite the abstract.

2. What seems to be the most important result proved/discussed in the article?

3. What is the most interesting aspect of the article, to you?

4. What is the most interesting question that occured to you as you were reading the article?

Math F665 – Configurations Fall 2010

Final Project Information

Your final project consists of two parts:

1. A paper addressing some interesting question in configurations. You have two choices:

   A research paper in this paper, you investigate a constrained problem in configurations, doing original research. Your topic should not be too broad.

   An expository paper choose an area of configurations, and write a summary/expository

   paper in which you explain other people's work, in a more accessible fashion.

2. An 10–12 minute presentation, in which you distill the contents of your paper and make it accessible to your peers.

Milestones:

1. No later than **November 12**: topic proposal due. This can be by e-mail. You should have found a topic youre interested in and cleared it with me already: here, you are providing a more detailed description of what you hope to accomplish. (You need to know enough about your topic at this point to be able to explain it to me in a way that I can understand.) *200 words or so—keep it short, but understandable.*

Paper: will be graded on interest of content, mathematical content, clarity of presentation, creativity, style/quality of presentation, and appropriateness to the assignment. 4–5 pages (6–10

pages if capstone.) You are expected to cite the work of others when you use it (paraphrasing counts too). Presentation: will be graded on clarity, organization, delivery, accuracy in the discussion of the mathematics and presentation of the application. 8 10 minutes (10 15 if capstone). Peer evaluation of presentations: You will be expected to evaluate carefully the presentations of your peers.

What grades mean, sort of:

An A paper takes the assignment and runs with it. It brings a fresh and original approach to the topic, yet thoroughly explains the mathematics under consideration. The language is clear, informative and a real pleasure to read. The paper shows something of the writer's heart: it convinces me that writer is genuinely interested in and cares about the subject matter. The paper is appropriately formatted and contains very, very few basic writing errors and shows evidence of thorough and thoughtful proofreading.

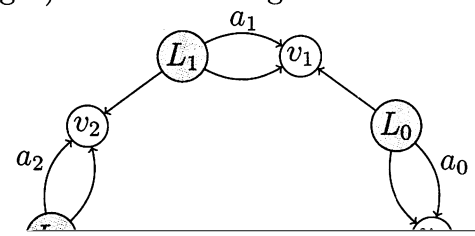
A B paper has a definite and clearly identified subject, an interesting approach to a topic, and a

thorough effort to cover the bases of the assignment. The author uses the source materials to substantiate his/her views and understanding of the material, though it may not contain the most subtle or clear analysis and exposition of ideas. The language of a B paper is clear, clean, and occasionally elegant but not necessarily interesting throughout. It may have a few basic errors in writing and proofreading.

Lab 3: Constructing symmetric 3-configurations

1 Multilateral and Snake configurations

The voltage graph skeleton for multilateral configurations (left) and snake configutations (right). Unlabelled edges are assumed to have label 0.



4. Construct lines of some span b with respect to the V_i ("red"), and after you've constructed them, reflect them to make (again, subtly different colored ("orange")) lines of span b with respect to the v_i as well.

5. We want to construct points W_i and w_i so that lines of span c connect the points W_i and w_i respectively, and also that W_0, W_c, v_d are collinear, for some d. (Note we're "crossing" symmetry classes here!) To do this:

   (a) Construct the circumcircle of $\Delta V_1 V_2$. Take an intersection of this circle with one of the ("red") span b lines connecting the V_i.

   (b) Use this to define the points W_i

   (c) Reflect them to define the points w_i

   (d) A line of span c with respect to the W_i will intersect the points v_i. Construct the class of lines.

   (e) Reflect this class of lines to get the rest of the symmetry class.

6. Play around with what happens as you change the angle between V_0 and v_0.

Question. *Can you come up with a coherent labelling scheme for this construction method and explain why it works?*