# Summary Report (07/24 /2014)

## Overview

In this week, I have done the following things:

* Analyze the distribution of the number of words in student’s responses
* Analyze the distribution of number of words in TA’s summary
* Analyze the distribution of number of words in Mead’s summary
* Get a summary with changing Length parameter in the Mead’s setting
* Get a summary with a percentage of words instead of sentences
* Whether the TA’s summary comes from the students’ responses

## Distribution of the number of words in student’s responses

### Overall

  

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | max | min | average | median |
| POI | 44 | 1 | 8.84 | 6.21 |
| MP | 44 | 1 | 9.27 | 6.86 |
| LP | 91 | 1 | 10.25 | 8.40 |

### Examples

|  |  |  |  |
| --- | --- | --- | --- |
|  | POI | MP | LP |
| Long | I found the polymers unit fascinating. I plan to take a future upper-division polymers course. Overall it was nice to be able to provide feedback on what I liked. Without the point of interest response it's hard to give this info to an instructor.  Usually made me think about the interesting applications of the class topic or interesting stones told, which sometimes made my outlook a little more positive but had no effect on my understanding of the material.  At the end of class, thinking about all the things we went over to remember a point of interest probably helped me put more of what I learned in long term memory | I was a little lost at the beginning of the lecture b/c it had been a while since I've used common chemistry terms (valance, cation, anion â€¦) how do you know when something is covalent + van der wall versus just van der wall  The grading is kind of confusing but as the class progresses I am sure it will be more clear. By the sounds of it, the grading has been chosen based on a method that will ensure students equal fairness and an opportunity to succeed  Atomic structure of glass ceramics (was not included in preview problem, skipped straight to processing?, explanation in class didn't go into detail about which bonds are ionic/ covalent, do you start w/ SiO2 then add an ion like just Ca? or add CaO?) | I learned that group review activities only serve to waste time. By moving at ? a slow rate, the class in doing a disservice to those who want to learn and are actually willing to put in their own effort to ensure leering should the class move at a too rapid p?. As it is, we learn maybe 1/3 of what we could in the valuable class time we are paying for and spend the other 2/3 of the time relearning, reviewing and relearning yet again what we were just taught!  I learned, or rather remembered, that I find group activities to not be helpful at all. Lectures are interesting & stimulating when they're on new material, but reworking the same in activities does not help me in the slightest. I would prefer to learn more concepts with my time than spend 15 min on a 5 min "activity". Sorry I'm just being honest.  The learning point was not something I filled out regularly. It was useful when I did learn something about how I learned . I liked the course and the instructor, so I liked being able to give feedback about learning about how I learned when I did have something to say.  I learn by hand on materials and being told things in bullet points about hands on materials. |
| Average | I found out how dislocations & defects affect material properties  I found out finding the structure of solids is interesting  Polymers in general are interesting. The O-chem is exciting  I found the planes intersting because I understood them  I like learning about how structure affects the properties  Factors that effect where it occurs on the curve  Candle is made of some polymer as milk jugs  The first transistor is less than 70 years old | Why does ductility reduce when a material is cold worked  The graphs of attraction and repulsion were confusing to me  Where along a crystal structure is the elastic modulus highest?  Where is Aâ‚€ & Af taken from? Are they given?  Everything went by to fast, not enough â€¦ to understand  I don't understand the age hardening graphs, they are confusing  Avalanche Diode graph going to AC to DC conversion graph  The stress vs. strain graph is still a little confusing | When I have fun learning the knowledge sticks to more  Drawing pictures is very handy when it comes to learning  The activities are very helpful in getting the point across  Relating prior knowledge and applying it helps understanding new materials  I enjoy working in groups and learning from my peers  It really didn't, but talking to peers was always helpful.  I like activities but I need them to be explained  I learn horribly sitting in the book of the class  Being able to see the unit cells helped with understanding |
| Short | ////////////////////  Applications  Diffusion  PIEZOELECTRICS  Solubility  ?  LED's  Materials  Everything  Tg  Microstructures  Carbides? | [blank]  nothing  Grading  Yes  Verbiage  Carries  Microstructure  Conduction  Calculations  Diffusion  Ceramics  Nothing  ?  No  Everything | Studying  N/A  Visually  Practice  Spatially  Review  [blank]  Activities  Nada  None  Pictures  Activity  Recap  Hi  Nothing |

### Observations

* For long responses, students might put several sentences together [a requirement to do sentence splitter]
* Students may give both sentences and phrases [How to extract the key phrase in a sentence?]
* Some responses have no means [They should be filtered out]
  + “None”, “?”, “No”, “Nothing”, [blank]
* Students like to start with first pronoun [Probably the next phrase is the interesting phrase]
  + “I like”, “I think”, “I found out”…
* Miss-spelling [Spell-checker]

### # of Words Changes week by week

* Error bar is the standard deviation

Observations:

* The average number of words given by the students doesn’t change a lot week by week
* However, the standard derivation are large. It means the number of words varies a lot among students.

## Distribution of the number of words in TA’s summary

### Normalized the TA’s Summary

* Sentences split
* Remove the count of the points in the end of a sentence
* Remove the sentence index in the beginning

### Normalization Examples:

“1) Group activity of analyzing bicycle's parts [12]” -> “Group activity of analyzing bicycle's parts”

“2) Materials processing [6]” -> “Materials processing”

“3) The main topic of this course [4]” -> “The main topic of this course”

### Word Count Distribution

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | max | min | average | median | std |
| POI | 44 | 1 | 8.84 | 7 | 6.21 |
| MP | 44 | 1 | 9.27 | 8 | 6.86 |
| LP | 91 | 1 | 10.25 | 8 | 8.40 |



### Examples

|  |  |  |  |
| --- | --- | --- | --- |
|  | POI | MP | LP |
| Long | The difference between Hot & Cold working a metal & its effects on the crystal structure of a metal  Different strengthening mechanism for single phase metals and their application (cold work: 3, solid solution hardening: 1, general: 7)  Solubility limits (Saturation graphs, Saturation and Temp. relation, 1 activity, how sturation limit affects other properties of materials)  Phase diagram (Composition of alloy, how it shifts from 1 phase to 2 phase, the giraffe!) | What is Cold Working, % Cw calculation, how to read its graphs, why ductility reduces by CW, CW vs hot work, CW vs Grain size reduction  Grain Size Reduction understanding, hall-Petch equation, Anealing relation to dislocation and grain size, recrystallization, properties of metals after grain growth  Differences between unit cells (BCC, FCC, etc), unit cell calculations related to r & a, unit cell volume | Negative: Bad Class environment (like turning to see the board, not being able to read the white board, noises from other classes, etcâ€¦)  Activities are very helpful (Including: activities with the graphs, doing it first by myself then within a group)  Group discussion helps a lot (including: explaining to others, learning from classmates or TAs)  Graphs and pictures help if: they are explained, they are well labled |
| Median | 3-D edge and screw dislocation models  The main topic of this course  Effect of defects on LED example  Types of fatigue behaivior (Fatigue limit)  Relative strenghts of different bond types  Group activity of analyzing bicycle's parts | Atomic Packing Factor and relation between a&r  In class activities (Spectially the first activity)  Understanding and applications of Fick's laws formula  Graphs of attraction/ repulsive & atomic separation  Activation energy's graph and factors affecting it | Phoenix to Tucson example helped  Interactive class is good  Pictures, diagram and examples  Activities and group working  Visual examples and graphs  Group activities are great |
| Short | Real world examples  Structure of salt  Tensile test  Stress-Strain curve  Elastic modulus  Materials processing  Test review  Dislocations | Fracture Toughness Testing  Homework assignments  Grading process  Electrical properties  Grain boundaries  Failure types  Packing density  HW#8 Elingation | Group activities  New Concepts  Hands-on activities  Pre-studying  Activities  Visually  Visualizing |

### Observations:

* Most of them are short
* Longer ones are not a single phrase but several phrases that are connected with each other [The TA did an abstract summary]
* They are phrases not sentences. Even the long summaries are a couple of phrases [A sentence summarization framework might not be good in this problem]
  + According to the name “POI” (**Point** of interest), “MP”(Muddiest **Point**), “LP” (Learning **Point**), the TA is definitely summarizing the points

## Distribution of the number of words in Mead’s Summary

.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | max | min | average | median | std |
| POI | 32 | 8 | 19.50 | 18.50 | 6.01 |
| MP | 44 | 9 | 20.25 | 18.00 | 8.32 |
| LP | 63 | 9 | 21.28 | 17.00 | 12.11 |

### Why Mead prefers long sentences?

* One of the default feature in Mead is “Length”, which is a cutoff feature. Any sentence with a length shorter than “Length” is automatically given a score of 0 and the default value is 9.
  + The minimal length of the Mead in our data is 8 because of different tokenizers.

## Mead summary with different cut-off values (single-document model)

* cut-off = 9: default one
* cut-off=1: with all sentences
* cut-off=5

### Distribution

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | max | min | average | median | std |
| POI | 32 | 1 | 16.58 | 17.50 | 8.46 |
| MP | 44 | 2 | 16.61 | 17.00 | 9.97 |
| LP | 63 | 1 | 17.97 | 14.00 | 13.12 |

### Rouge Score

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | POI | | MD | | LP | |
| Length | R2 | R-SU4 | R2 | R-SU4 | R2 | R-SU4 |
| cut-off=9 | 7.8% | 4.5% | 8.6% | 6.2% | 0.8% | 1.5% |
| cut-off=1 | 7.6% | 4.8% | 9.1% | 6.1% | 1.2%\* | 2.0%\* |
| cut-off=5 | 7.3% | 4.5% | 9.4% | 6.2% | 1.1% | 1.8% |

‘\*’ means significant different (p<0.05)

### Examples

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | TA | Mead |
| Good | POI | How bond strength is related to melting point;Relative strenghts of different bond types;Elastic modulus;How plastic bags are made by polymer fil blowing | I like learning about the microscopic explanation for the microscopic properties, especially, I liked learning about bond strengths;I thought it was interesting that the type of bond makes such a big difference in the temperature required to process different materials;How bond strength is related to melting point and that melting point is on the periodic table |
| Real examples of failures and why they happened (mostly airplane crash was mentioned);Different types of failures;Brittle vs Ductil fractions;Types of fatigue behaivior (Fatigue limit);Stell vs cast iron (brooklyn bridge);Tensile test;Influence of Temperature on impac Energy;Rlationship between fractures/ cracks and the crack length/ crack radius | How fractures/ cracks are in relation to the crack length & crack radius ? The application in Comet 1 planes w/ square windows;The stress vs. cycles of repetition and the idea that for steel there is a minimum stress of failur to number of cycles;How the square windows on the comet Airplane caused failure, vs. the round windows on the other airplane |
| Different strengthening mechanism for single phase metals and their application (cold work: 3, solid solution hardening: 1, general: 7);Different process of fabrication of metals (I-beams: 3, general: 3);Recrystallization & grain boundary changes;Misconception: even adding a weaker metal to a stronger metal will make the alloy stronger;3-D edge and screw dislocation models;Cyclotron and uranium info;The difference between Hot & Cold working a metal & its effects on the crystal structure of a metal;how to affect materials' strength & ductility;Dislocations | The difference between Hot & Cold working a metal & its effects on the crystal structure of a metal;I thought learning about the different applications and processes of metals was interesting;I really was interested in how different product (I- beams, bike gears, etc.) are made using different strengthening mechanism |
| MP | In class activities (Spectially the first activity);Atomic Packing Factor and relation between a&r;Which structure produce which materials' properties and how unit cell affects the processing | The math involved with finding atomic packing factor, and the relationship between a and r;Unit cell transformation pictures in 1st activity, 2nd activity (characteristics) # of atomic radii along touch directions with in unice cell;The atomic packing factor idea was very confusing and needed more explanation |
| Dislocations: how do they affect materials properties, how are they foremd;Last activity ( Effect of defects on materials properties);Grain boundaries;Different type of defects | The phase diagrams demonstrating solubility were a little confusing because I have only seen phase diagrams with one substance in the past;Explanation of 0-D (Point), 1-D (line), 2-D (Plane). Is this dealing with crystalline structures and plotting planes?;The most confusing point for me was the activity on effects of defects on materials properties |
| How does dislocation affect Thermal & Electrical conductivity;What is Cold Working, % Cw calculation, how to read its graphs, why ductility reduces by CW, CW vs hot work, CW vs Grain size reduction;Grain Size Reduction understanding, hall-Petch equation, Anealing relation to dislocation and grain size, recrystallization, properties of metals after grain growth;First activity, difference between deformation processing (Rolling, drawing, extrusion, etc);Final activity (Effect of CW, Annealing, grain size on Mechanical & other prop.);Why the strengthening occurs based on cold working or hot working;Why does lead allow for hot working at such a low temp?;Different strengthen mechanism | What is cold working and why does it increase Ys and Ts but not ductility;Why does lead allow for hot working at such a low temp?;How the electrical + thermal conductivity increases or decreases based on the dislocation density was a bit unclear |
| LP | Group activities;Visualizing;Per & Post test helps;Negative : Not seeing what is written on the white board | I learn best when I can see what the proffesor is pointing to;I like the drawing activities, I find them very helpful when it comes to learning about the materials;I learned that I learn very well by doing in class activities |
| Visual examples and graphs;Group activities;Real life examples | Activities, particulary ones with drawing & visuals help a lot;The examples of real life failure are a nice way to see the way failures occur and their causes. It's interesting to ? Examples to ? causes;I wish there were more activities, but I know that's hard to get a lot of them in |
|  |  |
| Bad | POI | Group activity of analyzing bicycle's parts;Materials processing;The main topic of this course | I thought it was interesting that only 3 families of materials were mentioned. Do all materials fit into those categories? Or are there others that not studied in this class?;I wasn't aware of what the class was about clearly the introduction during this first class fixed this information which was previously unknown;The most interesting thing in today's class was learning about the grading scale because I have never heard of a normalized grading scale, and I like the fairness of it |
| Specific structure & their properties;The real world examples and disasters relation to materials | You can grow silicon in different crystal structures (100, 111, 110) and this dictate the properties & type of transistor you can build;It was interesting to bring in history ( Napoleon) to class. Its easier to see a connection when I can see real life examples.;I thought it was interesting that shape metal alloys were used in nuclear submarines to protect the people from ‹ themselves with the water |
| Planes, the technique for drawing them, indexing them and being understandable;Structure of salt | Really liked the concept of planes and their directional relationship to the packing directions;It was interesting to learn about the specified planes because I understood it;I liked learning about and drawing the planes, its really fun and I found it interesting |
| Positive effect of defect, dislocastion and impurities on materials' properties;Solid solubility's rules;The examples of defect in the nature, Cactus and diamonds | . Defects can make material stronger. Mix of metals melts varied (slush);I thought learning about the defects was interesting because I never knew they could actually be a good thing;I found the solubility graphs of metals interesting how it depends mainly on atomic radius to see if two metals are soluble |
| MP | Grading process;Homework assignments;Differences between types of bonding | The grading is kind of confusing but as the class progresses I am sure it will be more clear. By the sounds of it, the grading has been chosen based on a method that will ensure students equal fairness and an opportunity to succeed;I think that even though grade normalizing was interesting, I think it was somewhat confusing and needs a little more explaining;Nothing presented was confusing, material that was given on the pre-test was confusing (Need to learn those topics) |
| Indexing (most confusing was: choosing the nw origin, then directions within unit cell and then fractions for indecies);Differences between unit cells (BCC, FCC, etc), unit cell calculations related to r & a, unit cell volume;APF and determining close packing | I understood everything but my group had problems with their coordinate systems. Maybe the similarities between this and vectors (unit vectors) could be emphasized;Why don't (like the coordinates of the origin) have round brackets around them? I understand that the vector needs square brackets but I thought points should be written (0,0,0);Unit cell directions- how they indexed- confused on how to find new origin |
| Different types of diffusion related processing (distinguishing them);Understanding and applications of Fick's laws formula;Activation energy's graph and factors affecting it;Understanding of what diffusion means and how it occur in metals;Mechanical properties calculation (in test review, problem III, stress-strain curve);Test review needs more time | I don't understand all of the diffusion types And their importance;Do you really read these? How do I know?How much does the woodpecker elongate? Include all assumptions;I found what diffusion actually is a bit confusing |
| LP | Working in a small group;Picures and visuals;Teaching to others | I like group discussions & learning, but not group assignments;I learned about different materials and I learned that I'm going to have to study hard for this class;I learned that I learn best by seeing things presented on the power point |
| Activities and group working;Pictures, diagram and examples | I think if work sheets required me to explain, I would think more critically;I learned that I learn better and stay more focused when we do the in class activities since I can see the application of what we learn put into play right away;I learned that I need to ask questions about what I don't understand |
| Group activities are great;Need more explanation before doing activities;Pictures and visuals | I learn better when I can see what the professor is pointing at;Because we had a different professor than normal, I learned that I can only learn by some professors. Some are harder to learn from than others. \*Also, I'm visual person.;I learned that I donft learn very well when the lecture begings to talk and teach at a very fast pace |
| Group activities help specially because of having the 4 steps instruction;Visuals help (pictures and graphs);Reviewing last week topic helps | I metacogged about my procedural knowledge and gained definitional knowledge of the term "definitional knowledge";I learned that I learn well by doing the in class activities with my table as a group;I learned that I really hate spending about 60% at class each day relearning what we already know what was told to us 2 days prior, or what was told to us twice or thrice already in the same class |

## Compression Rate controlled by absolute # of words

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | POI | | MD | | LP | |
|  | R2 | R-SU4 | R2 | R-SU4 | R2 | R-SU4 |
| default-sentence-3 | 7.8% | 4.5% | 8.6% | 6.2% | 0.8% | 1.5% |
| word-10% | 7.0% | 4.2% | 7.8% | 4.7% | 1.0% | 2.1% |
| word-20% | 8.2% | 4.8% | 8.6% | 5.6% | 0.6% | 1.1% |

It doesn’t change the ROUGE scores significantly. Actually, the control rate just changes the number of sentences that will be outputted but doesn’t change the rank of the sentences.

## Whether TA’s summary come from the responses?

### Sentence coverage

|  |  |  |  |
| --- | --- | --- | --- |
| Type | # of points | # of response points | coverage ratio |
| POI | 50 | 9 | 18.00% |
| MP | 59 | 11 | 18.64% |
| LP | 43 | 6 | 13.95% |

### Ngram coverage (tokenize by space)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Type | N | # of points | # of coveraged points | coverage ratio |
| POI | 1 | 368 | 293 | 79.62% |
| POI | 2 | 318 | 133 | 41.82% |
| POI | 3 | 269 | 73 | 27.14% |
| POI | 4 | 225 | 47 | 20.89% |
| POI | 5 | 187 | 35 | 18.72% |
| MP | 1 | 450 | 358 | 79.56% |
| MP | 2 | 391 | 166 | 42.46% |
| MP | 3 | 332 | 80 | 24.10% |
| MP | 4 | 280 | 44 | 15.71% |
| MP | 5 | 235 | 27 | 11.49% |
| LP | 1 | 239 | 168 | 70.29% |
| LP | 2 | 196 | 36 | 18.37% |
| LP | 3 | 157 | 4 | 2.55% |
| LP | 4 | 126 | 0 | 0.00% |
| LP | 5 | 101 | 0 | 0.00% |

### Ngram coverage (tokenize by punctuations)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Type | N | # of points | # of response points | coverage ratio |
| POI | 1 | 426 | 364 | 85.45% |
| POI | 2 | 376 | 148 | 39.36% |
| POI | 3 | 327 | 77 | 23.55% |
| POI | 4 | 282 | 48 | 17.02% |
| POI | 5 | 241 | 36 | 14.94% |
| MP | 1 | 529 | 466 | 88.09% |
| MP | 2 | 470 | 189 | 40.21% |
| MP | 3 | 411 | 84 | 20.44% |
| MP | 4 | 358 | 47 | 13.13% |
| MP | 5 | 311 | 29 | 9.32% |
| LP | 1 | 269 | 208 | 77.32% |
| LP | 2 | 226 | 38 | 16.81% |
| LP | 3 | 186 | 4 | 2.15% |
| LP | 4 | 153 | 0 | 0.00% |
| LP | 5 | 127 | 0 | 0.00% |

### Examples that are not covered

|  |  |  |  |
| --- | --- | --- | --- |
| ngrams with punctuation | frequency | ngrams without punctuation |  |
| group activities | 5 | ' s | 8 |
| They | 3 | : | 7 |
| Differences | 3 | ( | 6 |
| differences between | 3 | ) | 5 |
| cw | 3 | cw | 5 |
| examples | 3 | group activities | 5 |
| vs | 3 | they | 3 |
| graphs, | 3 | differences | 3 |
| solution | 2 | differences between | 3 |
| general: | 2 | stress - strain | 3 |
| between types of | 2 | graphs , | 3 |
| preview | 2 | #NAME? | 3 |
| and their | 2 | activity ( | 3 |
| properties and | 2 | , how | 3 |
| brittle vs | 2 | stress - | 3 |
| activity of | 2 | examples | 3 |
| differences between types of bonding | 2 | : 3 | 3 |
| differences between types of | 2 | on materials | 3 |
| reviewing | 2 | effect of | 3 |
| applications | 2 | materials ' | 3 |
| real life examples | 2 | vs | 3 |
| preview problem | 2 | general : | 2 |
| white | 2 | solution | 2 |
| (like | 2 | between types of | 2 |
| need more explanation | 2 | activity ( effect | 2 |
| first | 2 | negative | 2 |
| the class | 2 | preview | 2 |
| of failures | 2 | phase diagram ( | 2 |
| they are | 2 | reviewing | 2 |
| differences between types | 2 | distinguishing | 2 |
| the white | 2 | misconception : | 2 |
| on materials | 2 | cw , | 2 |
| graphs and | 2 | and their | 2 |
| materials properties | 2 | , the | 2 |
| mean? | 2 | ( including : | 2 |
| difusion | 2 | negative : | 2 |
| life examples | 2 | brittle vs | 2 |
| between types of bonding | 2 | stress - strain curve | 2 |
| what's | 2 | activity of | 2 |
| examples of | 2 | differences between types of bonding | 2 |
| 3, | 2 | first activity | 2 |
| if they | 2 | board , | 2 |
| from | 2 | differences between types of | 2 |
| and how | 2 | misconception | 2 |
| materials' | 2 | applications | 2 |
| (including: | 2 | , cw | 2 |
| between types | 2 | including : | 2 |
| cw, | 2 | first | 2 |
| cw vs | 2 | preview problem | 2 |
| on materials properties | 2 | white | 2 |
| examples and | 2 | cw vs | 2 |
| effect of | 2 | the white board | 2 |
| the alloy | 2 | need more explanation | 2 |
| board, | 2 | of failures | 2 |
| relation to | 2 | they are | 2 |
| misconception: | 2 | differences between types | 2 |
| metal will make | 1 | the white | 2 |
| class environment (like turning | 1 | what ' s | 2 |
| stell vs | 1 | , cw vs | 2 |
| the type of | 1 | what ' | 2 |
| for drawing | 1 | activities ( | 2 |
| are well | 1 | s parts | 2 |
| 3-d edge and screw | 1 | general | 2 |
| graphs and if they have | 1 | graphs and | 2 |
| point in the | 1 | activity ( effect of | 2 |
| and pictures help | 1 | materials properties | 2 |
| hardening: | 1 | real life examples | 2 |
| more explanation on graphs | 1 | pictures and | 2 |
| (comet crash, engine fallsâ€¦, world | 1 | difusion | 2 |
| indexing (most confusing | 1 | processing ( | 2 |
| hardening) | 1 | , general | 2 |
| help specially | 1 | activity , | 2 |
| why they happened (mostly | 1 | materials ' properties | 2 |
| will make | 1 | activity ) | 2 |
| how plastic bags | 1 | life examples | 2 |
| even adding | 1 | #NAME? | 2 |
| turning to see | 1 | ( like | 2 |
| in class activities (spectially | 1 | white board | 2 |
| happened (mostly | 1 | between types of bonding | 2 |
| eutectic composition and how the | 1 | ' s parts | 2 |
| & fraction total strain | 1 | ( including | 2 |
| vs cast iron (brooklyn bridge) | 1 | examples of | 2 |
| hot work, cw vs grain | 1 | relation | 2 |
| types of fatigue behaivior | 1 | properties and | 2 |
| for next class) help | 1 | if they | 2 |
| are and what does | 1 | different types of failures | 2 |
| and concept | 1 | from | 2 |
| specially | 1 | and how | 2 |
| of graph % | 1 | including | 2 |
| for stress, | 1 | affect materials | 2 |
| phase diagram graph | 1 | crash | 2 |
| do they affect materials | 1 | mean ? | 2 |
| between unit cells (bcc, fcc, | 1 | between types | 2 |
| others, | 1 | types of failures | 2 |
| (distinguishing | 1 | ( effect | 2 |
| calculation (in test review, problem | 1 | 3 , | 2 |
| to tucson example | 1 | on materials properties | 2 |
| (cold work: 3, solid solution | 1 | , general : | 2 |
| diagram (activity) | 1 | examples and | 2 |
| paper clips | 1 | ( effect of | 2 |
| vs ductil | 1 | the alloy | 2 |
| bad class environment | 1 | like | 2 |
| able to read | 1 | : 3 , | 2 |
| muddiest point in the beginning | 1 | relation to | 2 |
| able to read the white | 1 | diagram ( | 2 |
| (composition of alloy, how it | 1 | the class | 2 |
| the graphs and if | 1 | ' | 2 |
| extremly | 1 | ( comet | 1 |
| : not seeing | 1 | metal will make | 1 |
| dislocation and grain | 1 | classes , etc | 1 |
| to a stronger | 1 | does Î± + | 1 |
| and redoing | 1 | attraction / | 1 |
| for single phase metals and | 1 | the type of | 1 |

## Shallow Summarization

TODO

## Paper I read

<http://nb.mit.edu/f/15194>