Released
May 2007

ECE401

Perspectives In Electrical and Computer Engineering

Lecture 4

1

Last Time

- Finish up Challenge from Last Class
- What the Hell is it Friday
- Prelab for Laboratory 1
- Suggested Study Tips
- Thinking of Learning Styles
  - What is my learning Style?
    - How do I understand how I learn?

2

Today

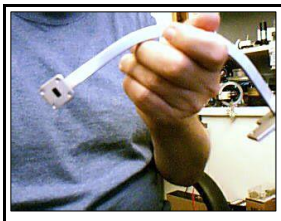
- Student Stress?
- What the Hell was it last Friday
- Final Tips for surviving classes
  - Text books
  - Writing
- Homework 3
- Learning styles
- How can I determine what is my learning style is?
  - How do I understand how I learn?

3

Student Stress Help

- Email: covid@unh.edu
- Phone: 862-2020

4

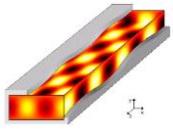


Last Friday's What the Hell is it Contest

- We have a Winner!

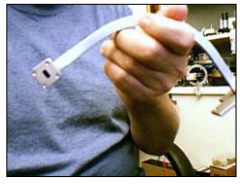
  Joel Pontbriand
  2:11 Time Stamp

5



It is a Microwave Waveguide

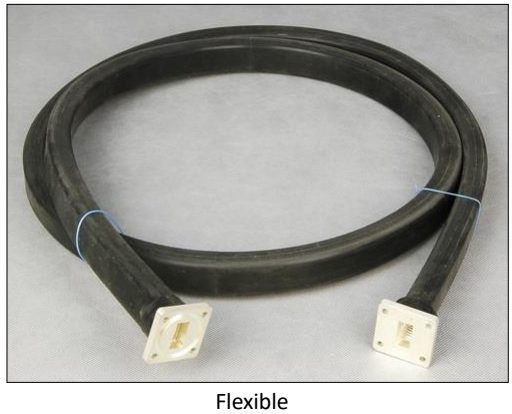
https://en.wikipedia.org/wiki/Waveguide



Ka Band

~ 27 GHz

Rigid



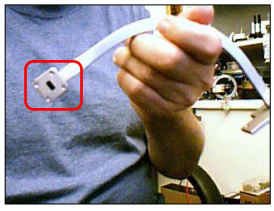
Flexible

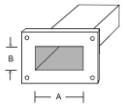
6

WAVEGUIDE CHART

DESIGNATION		FREQUENCY (GHz)		INSIDE DIMENSIONS		FLANGE INFORMATION				
BAND	EIA	TE10 MODE	CUT OFF	A	B	TYPE	SIZE	HOLES	UG-	MIL-F-
X	WR-90	8.2 - 12.4	6.56	0.900	0.400					
Ku	WR-62	12.4 - 18	9.49	0.622	0.311					
K	WR-42	18 - 26.5	14.05	0.420	0.170	Square Square Round	0.875 0.875 1.125	Clearance Threaded Threaded	595 / U	3922 / 68 - 001KM 3922 / 68 - 002KM 3922 / 67B - 004
Ka	WR-28	26.5 - 40	21.07	0.280	0.140	Square Square Round	0.750 0.750 1.125	Clearance Threaded Threaded	599 / U 381 / U	3922 / 68 - 001AM 3922 / 68 - 002AM 3922 / 67B - 005
Q	WR-22	33 - 50	26.34	0.224	0.112	Square Square Round	0.750 0.750 1.125	Clearance Threaded Threaded	383 / U	3922 / 68 - 001QM 3922 / 68 - 002QM 3922 / 67B - 006
U	WR-19	40 - 60	31.39	0.188	0.094	Square Square Round	0.750 0.750 1.125	Clearance Threaded Threaded	383 / Um	3922 / 68 - 001UM 3922 / 68 - 002UM 3922 / 67B - 007
V	WR-15	50 - 75	39.87	0.148	0.074	Round	0.750	Threaded	385 / U	3922 / 67B - 008
E	WR-12	60 - 90	48.37	0.122	0.061	Round	0.750	Threaded	387 / U	3922 / 67B - 009
W	WR-10	75 - 110	59.00	0.100	0.050	Round	0.750	Threaded	387 / Um	3922 / 67B - 010
F	WR-8	90 - 140	73.76	0.080	0.040	Round	0.750	Threaded	387 / Um	3922 / 67B - M08
D	WR-6	110 - 170	90.78	0.0650	0.0325	Round	0.750	Threaded	387 / Um	3922 / 67B - M06
G	WR-5	140 - 220	115.70	0.0510	0.0255	Round	0.750	Threaded	387 / Um	3922 / 67B - M05
-	WR-4	170 - 260	137.22	0.0430	0.0215	Round	0.750	Threaded	387 / Um	3922 / 67B - M04
Y	WR-3	220 - 325	173.55	0.0340	0.0170	Round	0.750	Threaded	387 / Um	3922 / 67B - M03
-	WR-2*	325 - 500	295.03	0.0200	0.0100	Round	0.750	Threaded	387 / Um	3922 / 67B
-	WR-1.5*	500 - 750	393.38	0.0150	0.0075	Round	0.750	Threaded	387 / Um	3922 / 67B
-	WR-1*	750 - 1100	590.06	0.0100	0.0050	Round	0.750	Threaded	387 / Um	3922 / 67B

(* ZAX DESIGNATIONS)





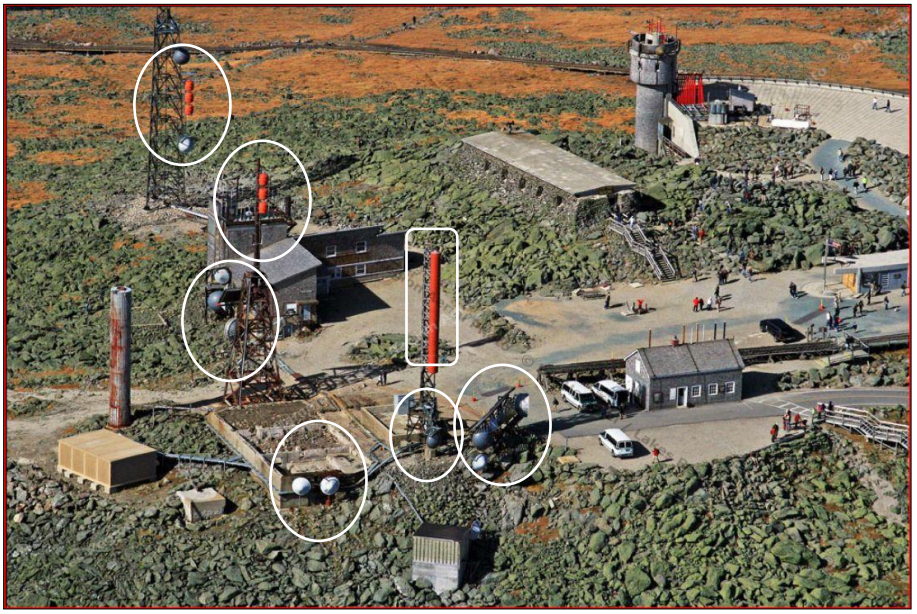
Ka Band is commonly used in Police Radar equipment

7

8

Mountain	Elevation	Difficulty
1. Washington	6288	Strenuous
2. Adams	5799	Strenuous
3. Jefferson	5716	Strenuous
4. Monroe	5372	Strenuous
5. Madison	5366	Strenuous
6. Lafayette	5260	Strenuous
7. Lincoln	5089	Strenuous
8. South Twin	4902	Strenuous
9. Carter Dome	4832	Strenuous
10. Moosilauke	4802	Moderate
11. Eisenhower	4760	Moderate
12. North Twin	4761	Strenuous
13. Carrigain	4700	Strenuous
14. Bond	4698	Strenuous
15. Middle Carter	4610	Moderate to Strenuous
16. West Bond	4540	Strenuous
17. Garfield	4500	Moderate to Strenuous
18. Liberty	4459	Strenuous
19. South Carter	4430	Moderate to Strenuous
20. Wildcat	4422	Strenuous
21. Hancock	4420	Strenuous
22. South Kinsman	4358	Strenuous
23. Field	4340	Moderate
24. Osceola	4340	Moderate
25. Flume	4328	Strenuous
26. South Hancock	4319	Strenuous
27. Pierce	4312	Moderate
28. North Kinsman	4293	Strenuous
29. Willey	4285	Strenuous
30. Bondcliff	4265	Strenuous
31. Zealand	4260	Strenuous
32. North Tripyramid	4180	Strenuous
33. Cabot	4170	Moderate to Strenuous
34. East Osceola	4156	Strenuous
35. Middle Tripyramid	4140	Strenuous
36. Cannon	4100	Moderate
37. Wildcat D	4062	Strenuous
38. Hale	4054	Moderate
39. Jackson	4052	Moderate
40. Tom	4051	Moderate
41. Moriah	4049	Strenuous
42. Passaconaway	4043	Strenuous
43. Owl's Head	4025	Strenuous
44. Galehead	4024	Strenuous
45. Whiteface	4020	Strenuous
46. Waumbek	4006	Strenuous
47. Isolation	4003	Strenuous
48. Tecumseh	4003	Moderate

9



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Slotted Waveguide Antennas

11

Text Books

- When you purchase your Text Books you **OWN** them
- Unlike borrowing a book from the Library you can:
  - Write in them
  - Paste or tape materials in them
  - Highlight items in them (multi-color worked for me)
  - Etc.
- Doing so can help you remember things often without having to reread whole sections of the text

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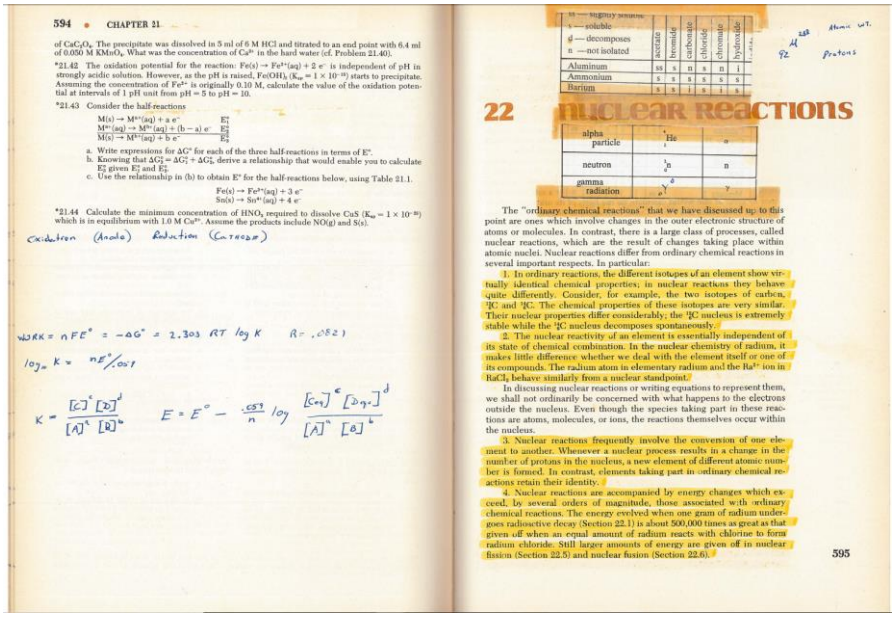
From my Freshman Chemistry Book



594 • CHAPTER 21

of CaC_2O_4. The precipitate was dissolved in 5 ml of 6 M HCl and titrated to an end point with 6.4 ml of 0.050 M $KMnO_4$. What was the concentration of Ca^{2+} in the hard water (cf. Problem 21.40).

*21.42 The oxidation potential for the reaction: $Fe(s) \rightarrow Fe^{2+}(aq) + 2\ e^-$ is independent of pH in strongly acidic solution. However, as the pH is raised, $Fe(OH)_2$ ($K_{sp} = 1 \times 10^{-15}$) starts to precipitate. Assuming the concentration of Fe^{2+} is originally 0.10 M, calculate the value of the oxidation potential at intervals of 1 pH unit from pH = 5 to pH = 10.

*21.43 Consider the half-reactions

$M(s) \rightarrow M^{n+}(aq) + a\ e^-$ E_1°
$M^{n+}(aq) \rightarrow M^{m+}(aq) + (b-a)\ e^-$ E_2°
$M(s) \rightarrow M^{m+}(aq) + b\ e^-$ E_3°

a. Write expressions for ΔG° for each of the three half-reactions in terms of E°.
b. Knowing that $\Delta G_3^\circ = \Delta G_1^\circ + \Delta G_2^\circ$ derive a relationship that would enable you to calculate E_2° given E_1° and E_3°.
c. Use the relationship in (b) to obtain E° for the half-reactions below, using Table 21.1.

$Fe(s) \rightarrow Fe^{3+}(aq) + 3\ e^-$
$Sn(s) \rightarrow Sn^{4+}(aq) + 4\ e^-$

*21.44 Calculate the minimum concentration of HNO_3 required to dissolve CuS ($K_{sp} = 1 \times 10^{-30}$) which is in equilibrium with 1.0 M Cu^{2+}. Assume the products include NO(g) and S(s).

Oxidation (Anode) Reduction (Cathode)

$WORK = nFE^\circ = -\Delta G^\circ = 2.303\ RT \log K$ $R = .0821$

$\log K = nE^\circ/.059$

$K = \frac{[C]^c[D]^d}{[A]^a[B]^b}$ $E = E^\circ - \frac{.059}{n} \log \frac{[C_{eq}]^c[D_{eq}]^d}{[A]^a[B]^b}$

	acetate	bromide	carbonate	chloride	chromate	hydroxide
s — soluble						
d — decomposes						
n — not isolated						
Aluminum	ss	s	n	s	n	i
Ammonium	s	s	s	s	s	s
Barium	s	s	i	s	i	s

22 NUCLEAR REACTIONS

alpha particle	^4_2He	α
neutron	^1_0n	n
gamma radiation	$^0_0\gamma$	γ

The "ordinary chemical reactions" that we have discussed up to this point are ones which involve changes in the outer electronic structure of atoms or molecules. In contrast, there is a large class of processes, called nuclear reactions, which are the result of changes taking place within atomic nuclei. Nuclear reactions differ from ordinary chemical reactions in several important respects. In particular:

1. In ordinary reactions, the different isotopes of an element show virtually identical chemical properties; in nuclear reactions they behave quite differently. Consider, for example, the two isotopes of carbon, ^{12}C and ^{14}C. The chemical properties of these isotopes are very similar. Their nuclear properties differ considerably; the ^{14}C nucleus is extremely stable while the ^{14}C nucleus decomposes spontaneously.

2. The nuclear reactivity of an element is essentially independent of its state of chemical combination. In the nuclear chemistry of radium, it makes little difference whether we deal with the element itself or one of its compounds. The radium atom in elementary radium and the Ra^{2+} ion in $RaCl_2$ behave similarly from a nuclear standpoint.

In discussing nuclear reactions or writing equations to represent them, we shall not ordinarily be concerned with what happens to the electrons outside the nucleus. Even though the species taking part in these reactions are atoms, molecules, or ions, the reactions themselves occur within the nucleus.

3. Nuclear reactions frequently involve the conversion of one element to another. Whenever a nuclear process results in a change in the number of protons in the nucleus, a new element of different atomic number is formed. In contrast, elements taking part in ordinary chemical reactions retain their identity.

4. Nuclear reactions are accompanied by energy changes which exceed, by several orders of magnitude, those associated with ordinary chemical reactions. The energy evolved when one gram of radium undergoes radioactive decay (Section 22.1) is about 500,000 times as great as that given off when an equal amount of radium reacts with chlorine to form radium chloride. Still larger amounts of energy are given off in nuclear fission (Section 22.5) and nuclear fusion (Section 22.6).

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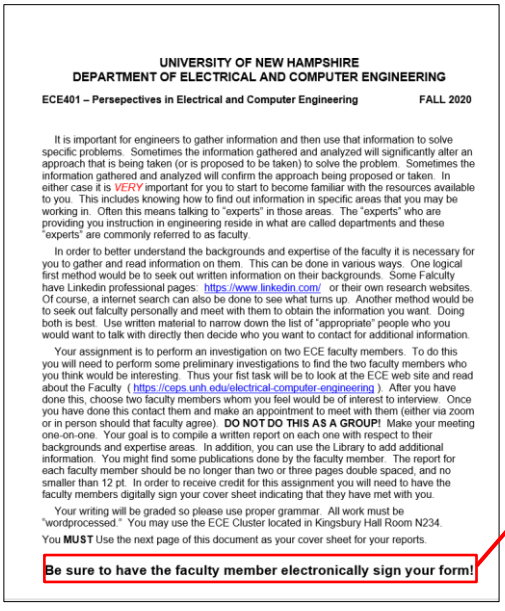
Homework 3



UNIVERSITY OF NEW HAMPSHIRE
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

ECE401 – Persepectives in Electrical and Computer Engineering **FALL 2020**

It is important for engineers to gather information and then use that information to solve specific problems. Sometimes the information gathered and analyzed will significantly alter an approach that is being taken (or is proposed to be taken) to solve the problem. Sometimes the information gathered and analyzed will confirm the approach being proposed or taken. In either case it is *VERY* important for you to start to become familiar with the resources available to you. This includes knowing how to find out information in specific areas that you may be working in. Often this means talking to "experts" in those areas. The "experts" who are providing you instruction in engineering reside in what are called departments and these "experts" are commonly referred to as faculty.

In order to better understand the backgrounds and expertise of the faculty it is necessary for you to gather and read information on them. This can be done in various ways. One logical first method would be to seek out written information on their backgrounds. Some Falculty have Linkedin professional pages: https://www.linkedin.com/ or their own research websites. Of course, a internet search can also be done to see what turns up. Another method would be to seek out falculty personally and meet with them to obtain the information you want. Doing both is best. Use written material to narrow down the list of "appropriate" people who you would want to talk with directly then decide who you want to contact for additional information.

Your assignment is to perform an investigation on two ECE faculty members. To do this you will need to perform some preliminary investigations to find the two faculty members who you think would be interesting. Thus your fist task will be to look at the ECE web site and read about the Faculty (https://ceps.unh.edu/electrical-computer-engineering). After you have done this, chose two faculty members whom you feel would be of interest to interview. Once you have done this contact them and make an appointment to meet with them (either via zoom or in person should that faculty agree). **DO NOT DO THIS AS A GROUP!** Make your meeting one-on-one. Your goal is to compile a written report on each one with respect to their backgrounds and expertise areas. In addition, you can use the Library to add additional information. You might find some publications done by the faculty member. The report for each faculty member should be no longer than two or three pages double spaced, and no smaller than 12 pt. In order to receive credit for this assignment you will need to have the faculty members digitally sign your cover sheet indicating that they have met with you.

Your writing will be graded so please use proper grammar. All work must be "wordprocessed." You may use the ECE Cluster located in Kingsbury Hall Room N234.

You **MUST** Use the next page of this document as your cover sheet for your reports.

Be sure to have the faculty member electronically sign your form!

ECE401 HOMEWORK 3

Professor Investigation

STUDENT NAME: ____

DATE COMPLETED: ____

Professors Interviewed: **Professor Signature**

1. ____ _____
2. ____ _____

Due November 6th at 5PM

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Writing is Fundamental

15

Writing is **FUN**da**MENTAL**

16

Connors Writing Center

The Connors Writing Center offers one-on-one writing conferences to current UNH students (undergraduate and graduate). We work with writers from all disciplines on many different kinds of academic writing. Our fifty-minute conferences are conducted by trained writing assistants who are UNH undergraduate and graduate students.

Collaboration is the core of the Connors Writing Center approach. Together, writer and writing assistant work to brainstorm and find a path through the revision process. We're here to support, assist, help, guide, and learn from writers.

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Helpful Resources

https://www.unh.edu/writing/resources

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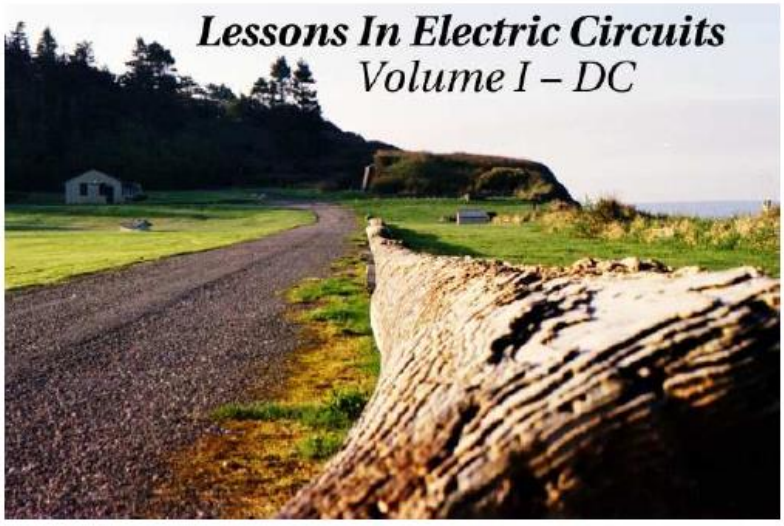

Fifth Edition, last update October 18, 2006

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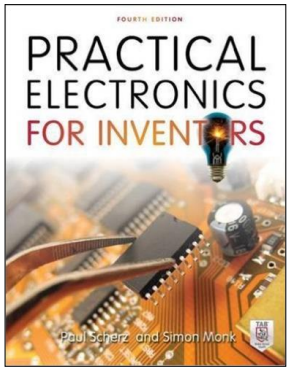
Reading 1

Reading 2



Keep Reading the rest of Chapter 2 to get ahead

20

Teaching Styles

21

Shifting the Paradigm from Teaching to Learning

Credits: Sam Clemence

Syracuse University

Modifications by: Richard A. Messner

University of New Hampshire

22

"Filling the Attic" Theory of Education

23

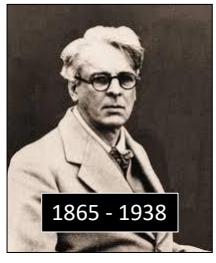
"Education is not filling a pail but lighting a fire"

William Butler Yeats

Irish Poet

Born in Dublin Ireland

Educated in London England



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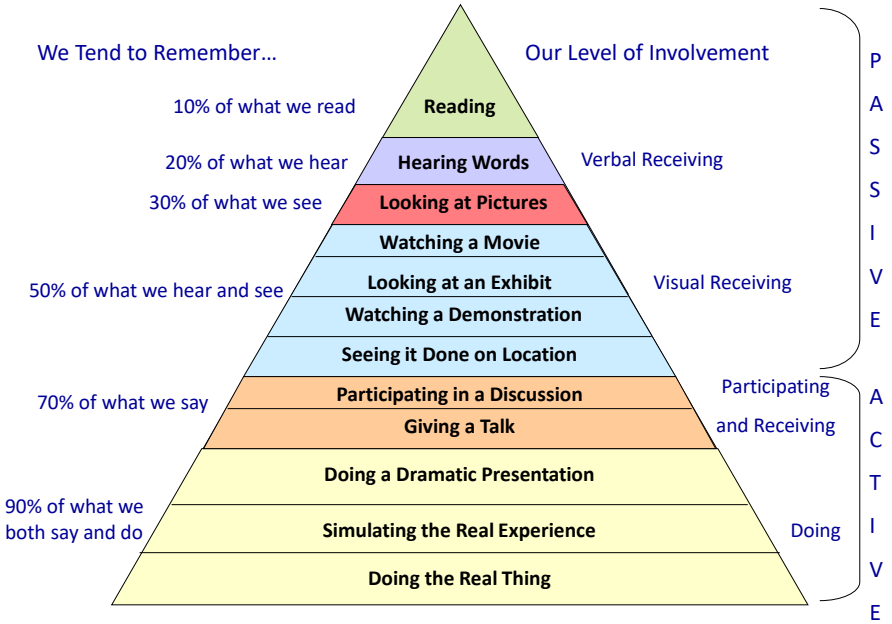
EXPERIENCE AND LEARNING



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Modes of Learning

Feeling	Learn by experience
Watching	Learn by observation
Doing	Learn by participation
Thinking	Learn by reflection

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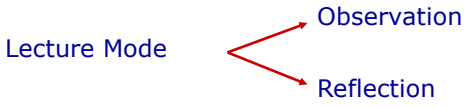
Modes of Teaching

DIDACTIC



Retention 10-20%

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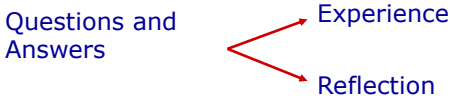
Modes of Teaching (cont.)

SOCRATIC



Retention 20-50%

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Modes of Teaching (cont.)

COACHING

Learn by Experience → Active

Learn by Experience → Experience and Observation

Retention 50-80%

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Consequences of Teaching-Learning Mismatches

- Students that are taught only in their *less-preferred mode* can't learn effectively
- Students that are taught only in their *preferred mode* won't develop balanced learning skills

30

Promoting Active Learning

Tell me, and I'll listen

Show me, and I'll understand

Involve me, and I'll learn.

Given the diversity of student learning styles— Three interrelated themes are crucial to promote active learning…

31

Promoting Active Learning

For active learning a teacher should try some of the following:

1. Use a variety of strategies for teaching and learning; not only on different days, but if possible within each classroom period!

32

Promoting Active Learning

2. Visual Reinforcements
   - Blackboards
     - old school, but still used today (i.e., whiteboards)
   - Overhead transparencies
     - old school seldom used today
   - 35 mm Slides
     - old school seldom used today
   - Powerpoint presentations
     - In use today
   - DVD Videos and streaming video
     - In use today
   - Handouts
     - Still in use today

- These are vital in order to focus attention and to verify verbal presentations

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Promoting Active Learning

3. Provide spaces in the context– If there are "holes" in your lectures the students may fill the space with:
   - Their own insights
   - Readings
   - Analysis
   - Connections

34

Promoting Active Learning

From my experience I have found that students learn best when they are involved directly in their intellectual discoveries

This is especially true if they relate to their own experiences

35

Conclusions

- Students of **all** learning styles will typically appear in classes
- We need **all** types in the engineering profession
- Faculty should try to address **all** styles in their classes, not just one!

36

Exam Time!

How do you learn?

You will have 5 minutes to complete the following test

37

Learning-Style: Instructions

The Learning-Style Inventory describes the way you learn and how you deal with ideas and day-to-day situations in your life. Below are 12 sentences with a choice of four endings. Rank the endings for each sentence according to how well you think each one fits with how **you** would go about learning something. Try to recall some recent situations where you had to learn something new, perhaps in your job. Then, using the spaces provided, rank a "4" for the sentence ending that describes how you learn **best**, down to a "1" for the sentence ending that seems **least** like the way you would learn. Be sure to rank all the endings for each sentence unit. Do not make ties

Example of completed sentence set:

When I learn: 4 I am happy 1 I am fast 2 I am logical 3 I am careful

38

Learning-Style Inventory
4=best, 1=least

1. When I learn:	__ I like to deal with my feelings	__ I like to watch and listen	__ I like to think about the ideas	__ I like to be doing things
2. I learn best when:	__ I trust my hunches and feelings	__ I listen and watch carefully	__ I rely on logical thinking	__ I work hard to get things done
3. When I am learning:	__ I have strong feelings and reactions	__ I am quiet and reserved	__ I tend to reason things out	__ I am responsible about things
4. I learn by:	__ feeling	__ watching	__ thinking	__ doing
5. When I learn:	__ I am open to new experiences	__ I look at all sides of issues	__ I like to analyze things, break them down to their parts	__ I like to try things out
6. When I am learning:	__ I am an intuitive person	__ I am an observing person	__ I am a logical person	__ I am an active person
7. I learn best from:	__ personal relationships	__ observations	__ rational theories	__ a chance to try out and practice

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Learning-Style Inventory
4=best, 1=least

8. When I learn:	__ I feel personally involved in things	__ I take my time before acting	__ I like ideas and theories	__ I like to see results from my work
9. I learn best when:	__ I rely on my feelings	__ I rely on my observations	__ I rely on my ideas	__ I can try things out for myself
10. When I am learning:	__ I am an accepting person	__ I am a reserved person	__ I am a rational person	__ I am a responsible person
11. When I learn:	__ I get involved	__ I like to observe	__ I evaluate things	__ I like to be active
12. I learn best when:	__ I am receptive and open-minded	__ I am careful	__ I analyze ideas	__ I am practical

Column 1	Column 2	Column 3	Column 4
$\sum$= __	$\sum$= __	$\sum$= __	$\sum$= __
$\sum 3 - \sum 1 =$ __		$\sum 4 - \sum 2 =$ __	

40

5-Minute Count Down Timer

4=best, 1=least

1. When I learn:	__ I like to deal with my feelings	__ I like to watch and listen	__ I like to think about the ideas	__ I like to be doing things
2. I learn best when:	__ I trust my hunches and feelings	__ I listen and watch carefully	__ I rely on logical thinking	__ I work hard to get things done
3. When I am learning:	__ I have strong feelings and reactions	__ I am quiet and reserved	__ I tend to reason things out	__ I am responsible about things
4. I learn by:	__ feeling	__ watching	__ thinking	__ doing
5. When I learn:	__ I am open to new experiences	__ I look at all sides of issues	__ I like to analyze things, break them down to their parts	__ I like to try things out
6. When I am learning:	__ I am an intuitive person	__ I am an observing person	__ I am a logical person	__ I am an active person
7. I learn best from:	__ personal relationships	__ observations	__ rational theories	__ a chance to try out and practice
8. When I learn:	__ I feel personally involved in things	__ I take my time before acting	__ I like ideas and theories	__ I like to see results from my work
9. I learn best when:	__ I rely on my feelings	__ I rely on my observations	__ I rely on my ideas	__ I can try things out for myself
10. When I am learning:	__ I am an accepting person	__ I am a reserved person	__ I am a rational person	__ I am a responsible person
11. When I learn:	__ I get involved	__ I like to observe	__ I evaluate things	__ I like to be active
12. I learn best when:	__ I am receptive and open-minded	__ I am careful	__ I analyze ideas	__ I am practical

Column 1	Column 2	Column 3	Column 4
Σ= __	Σ= __	Σ= __	Σ= __
Σ 3 - Σ 1 = __		Σ 4 - Σ 2 = __	

41

Time to Grade the Exam

42

Grading your exam

1. You grade your own exam!
2. No one can get a bad grade!
3. Sum columns 1, 2, 3, & 4 to produce:
   $\sum 1$, $\sum 2$, $\sum 3$, and $\sum 4$
4. Perform the following math equation:
   $\sum 3 - \sum 1 =$ ____
   $\sum 4 - \sum 2 =$ ____
   Results may be negative – that's OK
5. Plot on Learning-Style Type Grid

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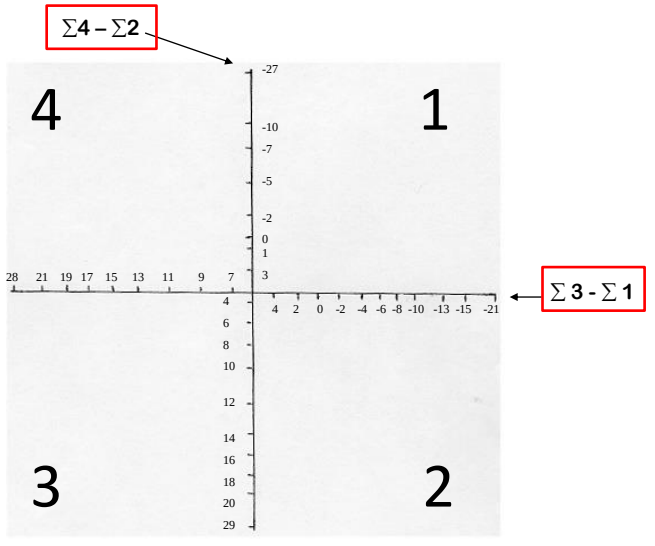
Learning-Style Type Grid



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Does Your Learning-Style Fit Your Academic Field?

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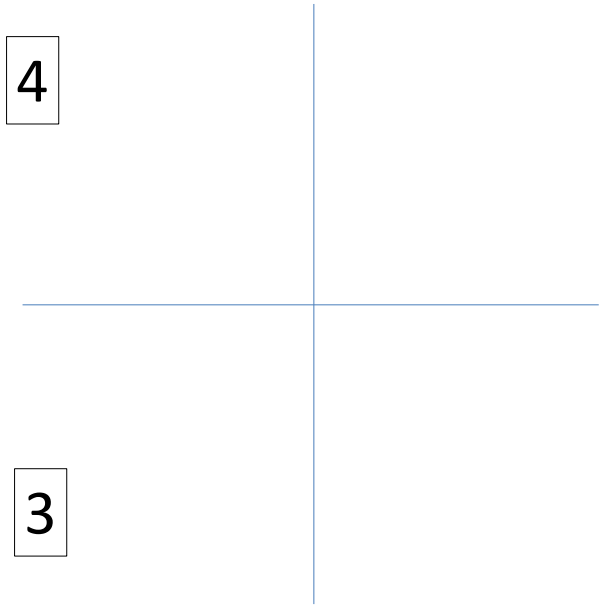
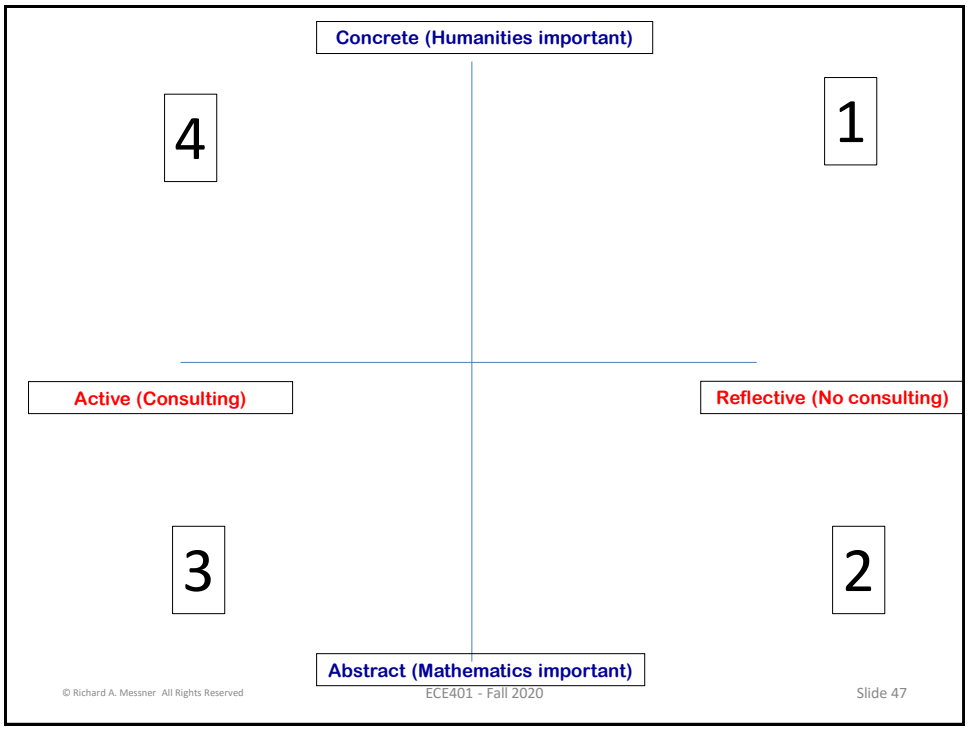


46


Concrete (Humanities important)
4
1
Active (Consulting)
Reflective (No consulting)
3
2
Abstract (Mathematics important)
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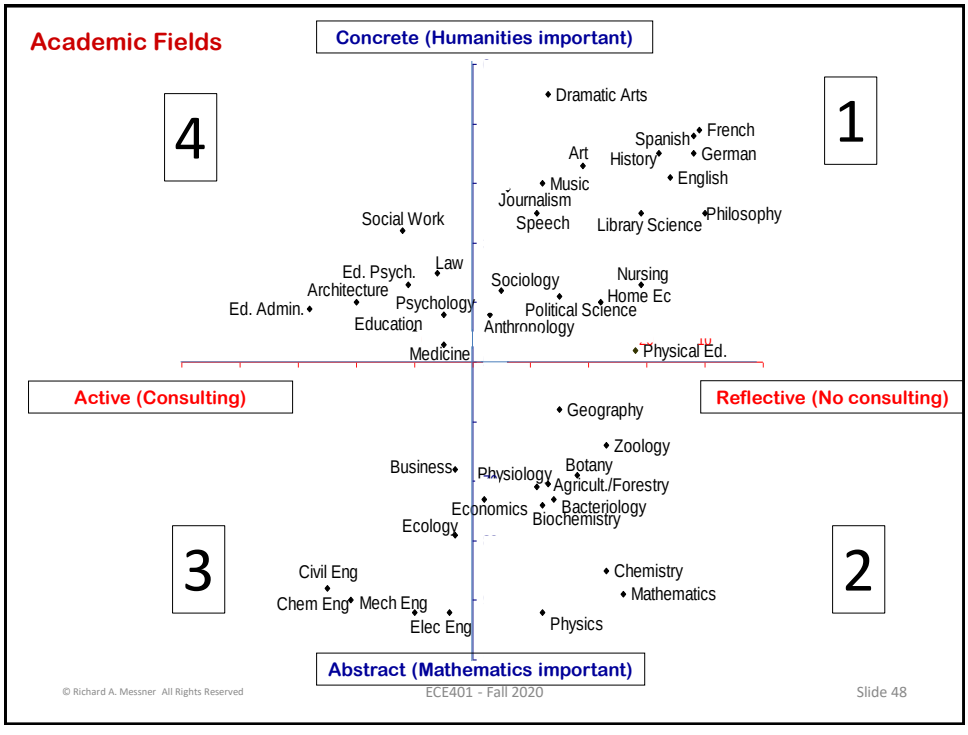
Academic Fields
Concrete (Humanities important)
4
1
Dramatic Arts
Spanish
French
Art
History
German
English
Music
Journalism
Social Work
Speech
Library Science
Philosophy
Ed. Psych.
Law
Sociology
Nursing
Architecture
Home Ec
Ed. Admin.
Psychology
Political Science
Education
Anthropology
Medicine
Physical Ed.
Active (Consulting)
Reflective (No consulting)
Geography
Zoology
Business
Botany
Physiology
Agricult./Forestry
Economics
Bacteriology
Biochemistry
Ecology
3
2
Civil Eng
Chemistry
Mathematics
Chem Eng
Mech Eng
Elec Eng
Physics
Abstract (Mathematics important)
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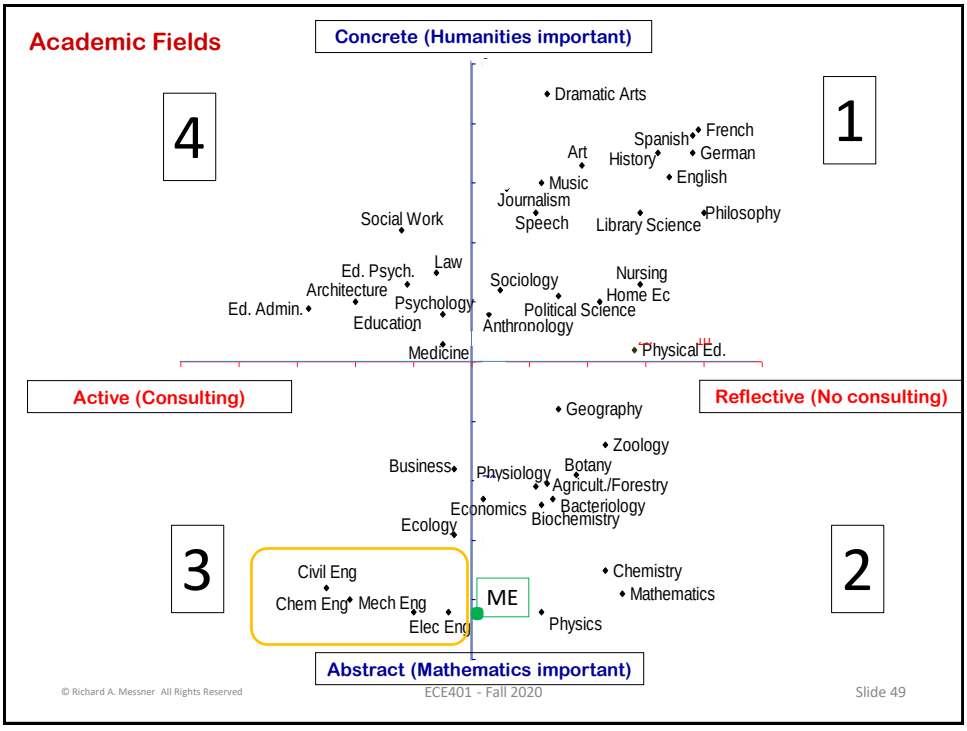
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Mech Eng
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Elec Eng
Physics
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End

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