EE 5200 - Lecture 2

Wed Sep 5th, 2012

Topics for Today:

- Introductions - about 36 enrolled (maybe a few more adding)
  - ~23 students on campus
  - ~13 online students
- Startup
  - Book, references, syllabus, more are on web page.
  - Software - Matlab*, ASPEN, ATP/EMTP, spreadsheets
  - EE5200-FA12-L@mtu.edu (participation is 5% of grade)
  - Lectures - new videotreams, archived video tutorials
  - Daily lecture notes scanned and .pdf file archived
  - Exercises posted as pdf on web page.
  - Grading: grad students must achieve B (80%) or higher
  - Grader: TBD < @mtu.edu>

* On-line students: Ordering instructions sent via e-mail.
• REVIEW, remedial: - Circuit Analysis Basics (Pre-Req Lect. #1)
  • Do all exercises in Ch.1 (solutions are posted)
  • Active vs. passive sign convention
  • Dual-subscript notation, single-subscript (implied reference)
  • Closure of subscripts in mesh equation
  • Euler’s Identity - basis for phasor analysis! See handout.
  • Drawing phasor diagrams, arrowheads
  • Three-phase, “open” vs. “closed” voltage phasor diagrams
  • Errata in text book - Figs. 1.16, 1.17.

• Study Chapters 1 and 2, view archive lectures 1-4
• No class on Friday Sep 14th (K-Day recess in afternoon)
• Classes resume on Monday.
• Note - I will be away, with guest lecturer or video
  • Nov 7th and 9th - Minnesota Power Systems Conference
• Need schedules of on-campus students to set weekly timeslot for videotaping of possible help sessions and make-up lectures.
# EE 5200

## Advanced Methods in Power Systems Analysis

Fall Semester 2012  
EERC B45 - M,W,F 1:05-1:55 pm

**Dr. Bruce Mork | Office Hours**

**UPDATED WEEK-BY-WEEK**

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<td>Term Project Guidelines</td>
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## Course Schedule and Coverage

Schedule and Coverage (Subject to Change Depending on Learning Needs of Students):

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<th>Weekly Coverage (Read Material Before Class)</th>
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| 1 - Ch. 1  
Smart Grid Overview | Sep 3rd  
L2 - Sep 5th  
Sep 7th | Course preparation - Study course pre-req materials. Rate your skills. Labor Day, no lecture. Proper Use of "Closed" Voltage Phasor Diagrams for Graphical Analysis  
Solutions: Ch.1 Review Probs (Complete by Sep 12th) |
| 2 - Ch. 1,2  
L4 - Sep 10th  
L5 - Sep 12th  
Sep 14th | CKTS | Answrs - Due Sep 14th, 5pm Mag Circuits Review  
Suggested Study Probs: 2.2, 2.4, 2.6, 2.8, 2.9, 2.14, 2.16, 2.17, 2.18, 2.21 (Ch.2 Soln)  
Transformer connections (Delta, Y, auto, zig-zag), core structure (G&S Overview)  
IEEE/IEC Phase Shifts (std 30°, non-std), 3-Winding Transformers, Nameplate, Schematic K-Day, no lecture. XFRM Homework (Due 5pm Fri Sep 21st) |
| 3 - Ch. 2  
L7 - Sep 17th  
L8 - Sep 19th | Three-Phase network analysis, per-phase, per-unit, transformer basics. Office Hr#1  
LTCs, 3-winding transformers, Factory Tests, Binary SC Impedance, star equivalent. | **xls**

Updated thru: Week 02 (updated week-by-week)
Prerequisite Material, Useful References (see course web page)

- Euler's Identity - The foundation of phasor analysis, as well as hyperbolic functions (used for long transmission lines)
- Basic Circuit Analysis, Thevenizing, Phasor Analysis, Impedance, P,Q,S, etc.: EE3120 pre-req practice problems | Solutions
- Basic 3-Phase Phasor Analysis - Review problem from EE3120
- Magnetic Circuits - quick review and introduction of how a transformer works
- Mutual Inductance - concept handout from EE3120 (refer to Section 2.2 of your text)
- Transformers 101 - Everything you wanted (or suddenly need to know) about transformers but were afraid to ask...
- Delta-Wye Transformer - detailed example with solution from EE3120
- EE 4221 Pre-Req Course Description
- EE 4222 Pre-Req Course Description
- Pre-Req Review Videos with Notes (from 2003 Archives)
  - Basic Circuit Analysis, Phasors, Three Phase Phasors: Lect 1 (skip first 12 mins) | Lect 1 Notes
  - Phasor Diagrams, Ideal Transformers, Nodal Analysis: Lect 2 (skip first 6:20) | Lect 2 Notes
  - Nodal Analysis, 3-phase circuits, Deltas and Wyes, Per Unit System: Lect 3 (skip first 3 mins) | Lect 3 Notes
  - Active & Passive Sign Convention for power flow, Per Unit, Transformers, Symmetrical Components: Lect 4 (skip first 2 mins) | Lect 4 Notes
  - Transformers, Induced Voltage & Polarity Marks, Phase Shift: Lect 5 (skip 3:45 - 5:20) | Lect 5 Notes
  - Phase Shift in Transformers, Phasor Diagrams, Application of Symmetrical Components: Lect 6 (skip first 3 mins) | Lect 6 Notes
  - Sample .m files from above tutorials: | for_ex.m | r2p.m | for_if_ex.m | while_ex.m | ft.m |
EE5200

- Review
- Notations
- Technical English
- Adjust to grad school.
- Software
  - Spreadsheets.
  - Matlab
  - Aspen - LF, SC, Relay
  - ATP/EMTP

WebCT
Graduate School

- Class size, proactive, anticipate.
- Size of exercises, scope, lead time.
- Concept-based approaches.
- Creative thought process.
- Communications.
  - E-mail
  - Spoken / informal / phone
  - Presentations / "ppt."
  - Written reports.

- Research & Development ( & Design)
  - "Scientific Method", conceptually sound.
Grad School – What to Expect

- Smaller size classes. Everybody is a top student, high expectations. Top students to study with, collaborate with.
- Take an active role in your education. Anticipate what needs to be done. Ask questions during lecture.
- Open-ended problems and projects, larger scope, longer deadlines.
- Professor will create an environment (lecture, lab, research) for you to succeed in, you do the rest.
- Stress concept-based approaches (instead of procedural), abstract thinking, reward for developing creative innovative approaches.
- Communications – develop excellent speaking and writing skills.
- Research – scientific method, conceptually sound, make an advancement on existing state of the art.
TIME MANAGEMENT

• Plan on 10 hrs/wk of focused productive time.
• Grad courses draw on pre-req concepts from undergraduate courses, so some weeks may be more.
• Online students:
  • View lectures at time convenient to work schedule.
  • Must keep to the same week-by-week schedule as on-campus students.
• Online students may have field assignments or need to travel. We try to be flexible...
• Homeworks:
  • Look it over early on, start discussions on e-mail forum
  • Take advantage of e-mail discussions: combine practical knowledge of online students with applied math and theoretical knowledge of on-campus folks.
  • Grad courses – can’t wait ‘til the night before to get started – there is no way you can complete it.
On-Campus

Theory, Math

On-line

Practice

Faculty

Use the e-mail Forum

EES200-L@mtu.edu!