Syllabus & Project Selection

ECE 403 Senior Design II

Week #1

Please visit Bison Academy for corresponding lecture notes,
homework sets, and videos
www.BisonAcademy.com

Introduction:

Senior Design is a 3-course sequence at NDSU. The overall goal of this sequence is

- To work in a group of 2-4 engineers,
- Demonstrate your ability to apply knowledge related to electrical and computer engineering, and
- Take a project from concept to design, build, test, and demonstration.

Course Information:

Instructors: Jake Glower, Jeff Erickson
Class Times   Fr 3pm, ECE 125
Office: ECE 201
Office Hours   Mo/We/Fr 11am - noon
Textbook: none
                        OneNote is requred as your lab notebook.
On-Line: www.BisonAcademy.com

Bulletin Description:

Capstone experience in formulation and design of a system or device. 1 lecture. Prereq: ECE 401.

Senior Design Sequence

ECE 401 Senior Design I

- Project Management (how to coordinate a group of engineers)
- Tools you will need in the later courses (CircuitLab, PCB layout, etc).
- PCB Layout with Fusion360

ECE 403 Senior Design II

- Take a larger project and split it in to N parts (one per student)
- Each student designs, builds, and tests a design for their part
- Each student also demonstrates their ability to apply knowledge of ECE

ECE 405: Design II

- Combine separate parts into a single working system
- Design, build, and test a PCB for your overall design

Essentially,

- Take what you did in ECE 401,
- Apply it to a larger, more complex system
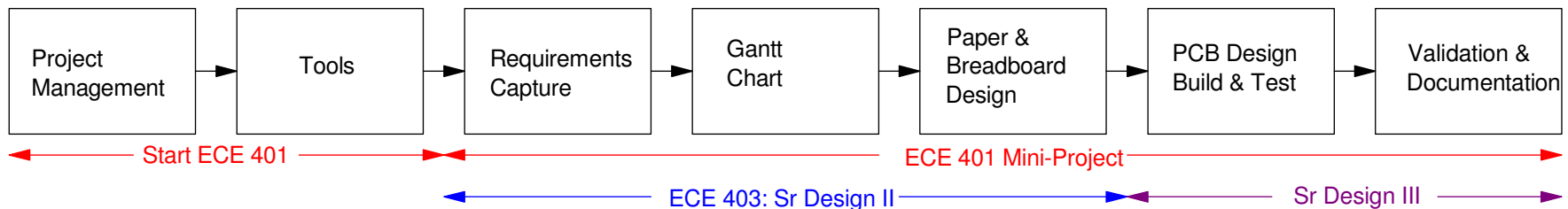- Over the span of two semesters

Note:

- ECE 403 is pretty much individual grades

  Each student needs to demonstrate his/her ability to apply knowledge of ECE

- ECE 405 is pretty much a group grade

  The closer you get to a working, packaged, tested design, the higher your grade

| Project Management | → | Tools | → | Requirements Capture | → | Gantt Chart | → | Paper & Breadboard Design | → | PCB Design Build & Test | → | Validation & Documentation |

◄──── Start ECE 401 ────► ◄──────────────── ECE 401 Mini-Project ────────────────►

◄──────────── ECE 403: Sr Design II ────────────► ◄──── Sr Design III ────►

Components of Senior Design at NDSU

Lab Notebooks (OneNote)

Similar to ECE 401, MicroSoft OneNote is used in 403 & 405

- Create a new OneNote document for your group
- The same OneNote document will be used throughout Design 2 & 3

OneNote works really well for Senior Design

- Work in these courses is cumulative
- With OneNote, you can easily see what you did previously
- With OneNote, the grader can easily see all of your work
- OneNote avoids having to write a 50 page report at the end
  OneNote is your final report

Syllabus

Senior Design II is really a lab-based class.

Weeks 1-5, class meets at its scheduled time and place

- 1: Explain projects you can choose from
- 2: Go over project management for Senior Design
- 3: Go over how to demonstrate your ability to apply knowledge of ECE
- 4: Go over ECE tools
- 5: Go over testing your breadboard circuits and/or your software

Week 6 onwards, class no longer meets. However

- Complete the tasks you identified during weeks 1-5
- While doing so, demonstrate your ability to apply knowledge of ECE
- Document your work in your section of OneNote
- Continue meeting with your project sponsor as needed

Grading

- All homework sets are submitted as sections in your group's OneNote document
- Homework sets 1 and 2 are group assignments
- Homework sets 3-10 are individual assignments:

   They should be different for each person in your group (different roles)

   They should be placed under each student's section in OneNote

- Note: You can revise your homework sets to improve your grade

   Don't interprit this to mean "put everything off until week #15"

   Final deadline for revisions is Friday of week #16 (dead week)

HW1	Project Selection	5%
HW2	Project Charter	10%
HW3	Tasks & ECE Concepts	10%
HW4	ECE Concept 1/4	12%
HW5	ECE Concept 2/4	12%

HW6	ECE Concept 3/4	12%
HW7	ECE Concept 4/4	12%
HW8	ECE Tools	12%
HW9	Test Equipment	10%
HW10	Sr Design Expo	5%

Overall Grade:

F	D	C	B	A
59% or less	60% - 69%	70% - 79%	80% -89%	90% or more

If you

- Work on your part of your senior design project throughout the semester,
- Are able to demonstrate your ability to apply knowledge of ECE
- Four different ways, and
- Use two ECE tools to test your design

you should be able to get an A in Senior Design II.

401 vs. 403/405

Limitations in ECE 401 are lifted in ECE 403/405

	ECE 401	ECE 403/405
PCB Size	2" x 2"	up to 60 square inches
Mounting Holes	200 mils	200 - 250 mils
Ground Plane	yes	yes
Power Plane	yes	Depends upon design
Trace Width: Power	40 mils	8 mils to 600 mils
Other Traces	20 mils	8 mils to 600 mils
Test Points	6+ Through Hole	6+ Surface Mount or Through Hole
Components	Through Hole	any (0805, TSOP, DIP, etc.)

	ECE 401	ECE 403/405
Silk Screen (top)	yes include date & group number	yes include date & group number
Silk Screen (bottom)	no	yes if components placed on both sides of board
Font Size	50 mil or larger height/10 for thickness	50 mil or larger height/10 for thickness
Digikey Trace Width Calculator	optional	Longest trace with highest current
LEDs	5mm Through Hole Design for 100mA Build for 20mA	Any size, any number 0805 recommended Place on power, ground, other signals
Power	9V battery 7805 to step down to 5VDC	any
Fuse	1 Ohm resistor Add reverse polarity protection	optional

Legal Stuff:

Attendance: According to NDSU Policy 333 (www.ndsu.edu/fileadmin/policy/333.pdf), attendance in classes is expected. Students are responsible for the material covered in class and in assignments regardless of their attendance. Note that all lecture notes, homework sets, and solutions are available on-line at www.BisonAcademy.com

Students with Special Needs: Any students with disabilities or other special needs, who need special accommodations in this course, are invited to share these concerns or requests with the instructor and contact the Disability Services Office (www.ndsu.edu/disabilityservices) as soon as possible.

Academic Honesty: The academic community is operated on the basis of honesty, integrity, and fair play. NDSU Policy 335: Code of Academic Responsibility and Conduct applies to cases in which cheating, plagiarism, or other academic misconduct have occurred in an instructional context. Students found guilty of academic misconduct are subject to penalties, up to and possibly including suspension and/or expulsion. Student academic misconduct records are maintained by the Office of Registration and Records. Informational resources about academic honesty for students and instructional staff members can be found at www.ndsu.edu/academichonesty.

Academic Honesty Defined: All written and oral presentations must "respect the intellectual rights of others. Statements lifted verbatim from publications must be cited as quotations. Ideas, summaries or paraphrased material, and other information taken from the literature must be properly referenced" (Guidelines for the Presentation of Disquisitions, NDSU Graduate School).

ECE Honor Code: On my honor I will not give nor receive unauthorized assistance in completing assignments and work submitted for review or assessment. Furthermore, I understand the requirements in the College of Engineering Honor System and accept the responsibility I have to complete all my work with complete integrity.

Veterans and Student Soldiers: Veterans and student soldiers with special circumstances or who are activated are encouraged to notify the instructor in advance.