

EECE401 Senior Design I

Electrical Engineering and Computer Science
Howard University

Instructor
Dr. Charles Kim
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Fall 2019

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Senior Design I

⌘ **EECE 401** (3 credit hours)

☒ Class Hours: M 1310 – 1600

☒ Classroom: LKD 3105

⌘ **Instructor**

☒ Dr. Charles Kim

☒ (202)806-4821

☒ ckim@howard.edu

☒ Office Hours (LKD3014): Open Door Policy

☒ TW 1400 – 1600

⌘ **Web ---Syllabus, Notes, etc**

☒ Classes and material of previous academic years

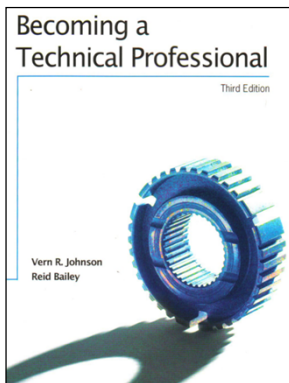
☒ www.mwftr.com/SD.html [*Note: case-sensitive]

☒ Then choose 2019 - 2020 academic year

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Textbook

⌘ Textbook – highly recommended



⌘ *Becoming a Technical Professional*

- ☒ Authors: Vern Johnson and Reid Bailey
- ☒ Kendal/Hunt Publishing Co.
- ☒ 3rd Edition
- ☒ ISBN 13:978-0-7575-2765-4
- ☒ Written for first-year engineering students
- ☒ Process/Idea is same for seniors with actual application & implementation of the process & idea.

⌘ *Creative Design of Products and Systems*

- ☒ Author: Niku
- ☒ Wiley

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Engineering Design – Topics and Objectives

⌘ Topics

- ☒ Engineering Design Overview
- ☒ **Problem Formulation**
- ☒ **Problem Solving**
- ☒ **Solution Implementation**
- ☒ The Art and Science of Creativity
- ☒ Project Management
- ☒ Technical Presentation
- ☒ Technical Writing

⌘ Objectives

- ☒ Understanding an engineering design **process**
- ☒ Understanding **the 3 phases** of design and how design is an adaptive, systematic process
- ☒ Applying a design process to meet a set of **needs**
- ☒ Design under constraints
 - ☒ **Budget**
 - ☒ **Time**
 - ☒ **Regulation/Standards**
 - ☒ **Environments**

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Course Outcomes - Recap

- ☒ Design a system component, process, or system within restrictions of economy, culture, environment, ethics, health, and safety
- ☒ Identification, formulation, and solving engineering problems
- ☒ Effective team player in multidisciplinary environment
- ☒ Effective communicator
- ☒ Recognition of the need for, and an ability to engage in life-long learning
- ☒ Knowledge of contemporary issues

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"Senior Design" – brief definition

⌘ Senior Design is:

- ☒ Culmination of EE/CpE Education and Training
- ☒ Solving a () or meeting ()
- ☒ **Design experience** that requires adequate consideration of
 - ☒ ()
 - ☒ ()
 - ☒ ()
 - ☒ () related to the **ECE discipline**.
- ☒ **Process** to final product
- ☒ Usually team-based problem solving.
- ☒ A part of a long-term research project as in VIP



⌘ Senior Design is NOT:

- ☒ Further expansion of a class project
- ☒ Final product only

standards.ieee.org

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What is “Standard”?

⌘ **Design *experience*** that requires adequate consideration of

- ⊗ (**Knowledge**)
- ⊗ (**Standard**)
- ⊗ (**Constraints**)

IEEE STANDARDS

⌘ **What is Standard?**

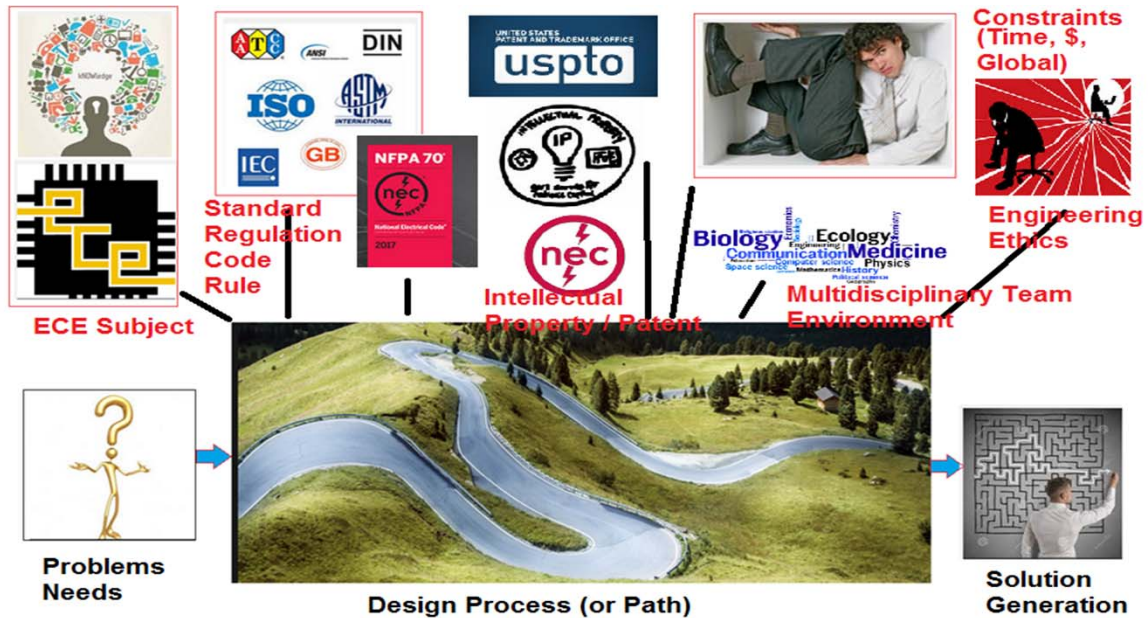
⊗ **Technical Standard** – an established norm or requirement about technical system



“Senior Design” – brief definition ?

The collage features several logos and images: AT&T, ANSYS, DIN, ISO, ASTM, IEC, GB, NFPA 70, uspto, and NEC. It also includes a person thinking, a person working at a computer, a person looking at a maze, and a word cloud with terms like Biology, Ecology, Communication, Medicine, and Physics.

“Senior Design” – brief definition ?



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“Design” – Full Definitions : ABET

- ☒ “A () of devising a system, component, or process to () desired needs,”
- ☒ which involves “a () process (often iterative), to convert resources optimally to meet the stated needs” by applying (), () and (),
- ☒ with adequate consideration of (), (), and () in the subject related to the electrical/computer engineering discipline.”

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“Design” – Full Definitions: Industry

- ⊞ “Determine that a () exists with customers for specific goods or services and how much those customers are able and willing to () for it.
- ⊞ Then determine if the product or service is () with the competencies of the company and if it can be manufactured at a () that is less than the customers will pay.
- ⊞ If so, proceed by designing to match the company’s () to manufacture,
- ⊞ Finally, prior to full implementation, prepare a pilot ()”

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Class Schedule

- ⌘ Join a VIP team (from 7 (or 8) candidate teams)
 - ⊞ Approval from the Instructor is required
 - ⊞ Usually: No more than 3 senior students in a VIP team
 - ⊞ **Specifically this semester: 2 & 2 & 3 (plus underclass students – Jr, Sp, and Fr)**
- ⌘ Early September : Selection of “**project team**” from the 7 (or 8) candidate VIP teams
- ⌘ Mid-October: Solution Design Review
- ⌘ Mid-November: Solution Design Presentation

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Senior Design II - Class Schedule (Spring)

- ⌘ Design Implementation: Jan-Feb-Mar
- ⌘ Design Evaluation: Mar-Apr
- ⌘ Final Presentation in annual EECS day:
April

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VIP (Vertically Integrated Projects) Program



- ⌘ **Integration** of Research, Education (Teaching & Training), and Service
- ⌘ **Inclusion** of UG students in to Research and Innovation
- ⌘ **Faculty Research Project** –based and **Long-Term**
- ⌘ **3 Core ingredients**
 - ☒ **Vertical Mentoring** from Faculty to GR to UG (SR to JR to SP)
 - ☒ **Integration** of research and education in multidisciplinary team environment
 - ☒ **Long-Term Project**: Long (2 – 4 year participation) enough for students to master **skill set** for innovation

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Candidate project teams

- ⌘ Link to VIP at Howard Teams
(WWW.MWFTR.COM/VIPatHOWARD.html)
 - ☒ AutoMoe (autonomous car): Dr. Rawat
 - ☒ Terminator (Tic Tac Toe Machine): Dr. Kim
 - ☒ Intelligent Traffic Control: Dr. Salmani
 - ☒ Deliveroid (Package Delivery Robot): Dr. Kim
 - ☒ Sandia Project : Dr. Amoo
 - ☒ SLAM: Dr. Amoo
 - ☒ Possible1: Solar Competition
 - ☒ Possible2: Other competition
 - ☒ Possible3: Prediction of () by Social Media chat analysis
- ⌘ **Each team is expected to recruit and include at least 2 underclass students of EE, CpE, CS, ME, or any major**

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Action Items of this week and next

- ⌘ Join a VIP team
 - ☒ No more than 3 senior students in a team
- ⌘ Define (with your VIP advisor and team members) the “Senior Design Project portion” for the academic year from the long-term project goal.
 - ☒ Team’s long term goal → Academic-year goal for senior design class
- ⌘ Recruit other students (of juniors and sophomores of Engineering, Computer Science, etc.) in to your team

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Course Expectation

⌘ Expectation

- ⊠ Attendance
- ⊠ Active Participation (class and team activities out of the class)
- ⊠ Assignments
- ⊠ Active interaction with VIP team advisor (and graduate assistant, if applicable)
- ⊠ Everything activity counts toward the course grade
- ⊠ Professional manner
- ⊠ Multidisciplinary Teamwork

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Course Grading Policy

⌘ Grading

- ⊠ Individual Score (I): 35%
 - ⊠ Attendance (5 %): only on-time arrival counts
 - ⊠ Homework + Others (20 %)
 - ⊠ Final Exam (10 %)
- ⊠ Group Score (G): 70%
 - ⊠ Team activities (30 %)
 - ⊠ Team Assignment (20 %)
 - ⊠ Team Presentation (20 %)
- ⊠ Peer Evaluation Score (P): 0 – 1.0
- ⊠ FINAL SCORE (S)
 - ⊠ $S = I + G * P$

⌘ Grades

- ⊠ A: 90 – 100
- ⊠ B: 80 – 89
- ⊠ C: 70 – 79
- ⊠ D: 60 – 69
- ⊠ F: 0 - 59

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