



EECE401 Senior Design I

Electrical Engineering and Computer Science
Howard University

Instructor
Dr. Charles Kim
[ckim@howard.edu]

Fall 2018

Senior Design I - Fall 2018

⌘ **EECE 401** (3 credit hours)

☒ Class Hours: M 1310 – 1600

☒ Classroom: LKD 3121

⌘ **Instructor**

☒ Dr. Charles Kim

☒ (202)806-4821

☒ ckim@howard.edu

☒ Office Hours (LKD3014): Open Door Policy

☒ TR 1400 – 1600

⌘ **Web ---Syllabus, Notes, etc**

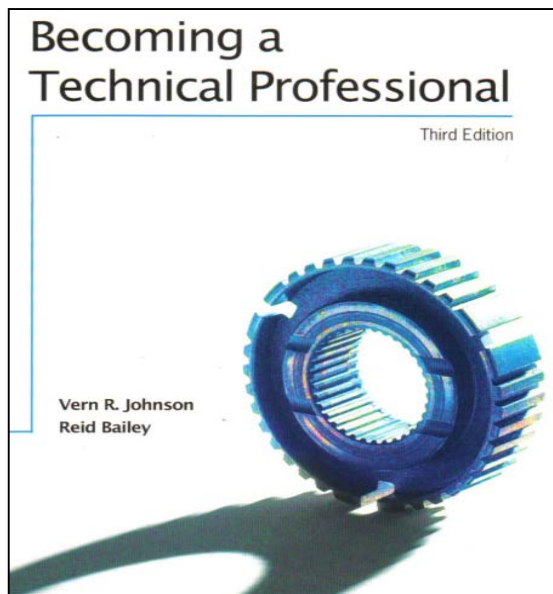
☒ **Classes and material of previous academic years**

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

☒ Then choose 2018 - 2019 academic year

References

⌘ No
Textbook
required



⌘ *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

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**

Course Outcomes (1/2)

⌘ Course Outcomes (ABET)

- ☒ (c) Design a system component, process, or system within restrictions of economy, culture, environment, ethics, health, and safety–
 - ☒ **Throughout the class, we learn the design process and apply it and integrate to a working system which solves customers' problem under socio-cultural and environmentally responsible alternatives**
- ☒ (d) Effective team player in multidisciplinary environment -
 - ☒ **Working with students in different majors and levels with (1) task achievement and (2) relationship building**
- ☒ (e) Identification, formulation, and solving engineering problems -
 - ☒ **The main focus of the course**

Course Outcomes (2/2)

⌘ Course Outcomes (ABET)

☒ (g) Effective communicator –

☒ **Presentations and report writing will enhance verbal, written, and slide communication**

☒ (i) Recognition of the need for, and an ability to engage in life-long learning –

☒ **Awareness and Benefit of the continued, non-stop learning of new technology**

☒ (j) Knowledge of contemporary issues –

☒ **Recognize and Understand the contemporary issues and their impact to society and the project itself.**

“Senior Design” – brief definition

⌘ 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



⌘ Is NOT

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

standards.ieee.org

What is “Standard”

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

⊗ ()

⊗ (**Standard**)

⊗ ()

⌘ **What is Standard?**

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

IEEE STANDARDS



“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.”

“Design” – Full Definitions

⌘ Industry

- ☒ (1) “Determine that a () exists with customers for specific goods or services and how much those customers are able and willing to_ () for it.
- ☒ (2) 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.
- ☒ (3) If so, proceed by designing to match the company’s () to manufacture,
- ☒ (4) Finally, prior to full implementation, prepare a pilot ()”

Class Schedule (Fall 2018)

- ⌘ Join a VIP team (from 7 (or 8) candidate teams)
 - ☒ Approval from the Instructor is required
 - ☒ **No more than 3 senior students in a VIP team**
- ⌘ 9/10/2018: Selection of “**project team**” from the 7 (or 8) candidate VIP teams
- ⌘ 9/24/2018: 1st ECE-ME joint Session @ maker space
- ⌘ 10/29/2018: 2nd ECE-ME joint session for Solution Design Review
- ⌘ 11/26/2018: 3rd ECE-ME joint session for Solution Design Presentation

Class Schedule (Spring 2019)

- ⌘ Design Implementation: Jan-Feb-Mar 2019
- ⌘ Design Evaluation: Jan-Feb-Mar-Apr 2019
- ⌘ Final Presentation: Apr 2019

- ⌘ **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
- ⌘ University: **Broadening university community** for everyone to participate, which provides students with compelling reason to be on campus and on one's major

Candidate VIP teams

⌘ Link to VIP at Howard Teams

(WWW.MWFTR.COM/VIPatHOWARD.html)

- ☒ AutoMoe (autonomous car): Dr. Rawat
- ☒ Terminator (Tic Tac Toe Machine): Dr. Kim
- ☒ E-Trike (Battery Powered Trike): Tim Brown
- ☒ Deliveroid (Package Delivery Robot): Dr. Kim
- ☒ EV (electric vehicle): Dr. Grakpe
- ☒ Graphone (Graphene Microphone): Dr. Bae
- ☒ Sandia Sensor (Integrated Environment Sensor): Dr. Warner
- ☒ Possible1: Baja Competition (Dr. Warner)
- ☒ Possible2: Seismolator (Dr. Martin)

⌘ **Expect to see ≥ 2 ME students in each of the above teams**

⌘ **Expect to meet many underclass students (Jr, Sp, and Fr) from many different programs**

Things to do and complete by Monday 9/10/2018

- ⌘ Join a VIP team
 - ⊗ No more than 3 senior students in a team
 - ⊗ We will finalize the team formation in the Monday 9/10/2018 class
- ⌘ Define (with your VIP advisor and team members) the “Senior Design Project portion” for 2018-2019 academic year from the long-term project goal.
- ⌘ Recruit other students (of juniors and sophomores of Engineering, Computer Science, etc.) in to your team – helping hands
- ⌘ Expect to see ≥ 2 ME students in each of the above teams
- ⌘ Expect to meet many underclass students (Jr, Sp, and Fr) from many different programs

Course Grading and Expectation

⌘ Expectation

- ☒ Attendance
- ☒ Active Participation (class and team activities out of the class)
- ☒ Assignments
- ☒ Active interaction with VIP team advisor and graduate assistant
- ☒ Everything counts
- ☒ Professional manner
- ☒ Multidisciplinary Teamwork

⌘ 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 (F)
 - ☒ $F = I + G * P$

⌘ Grades

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