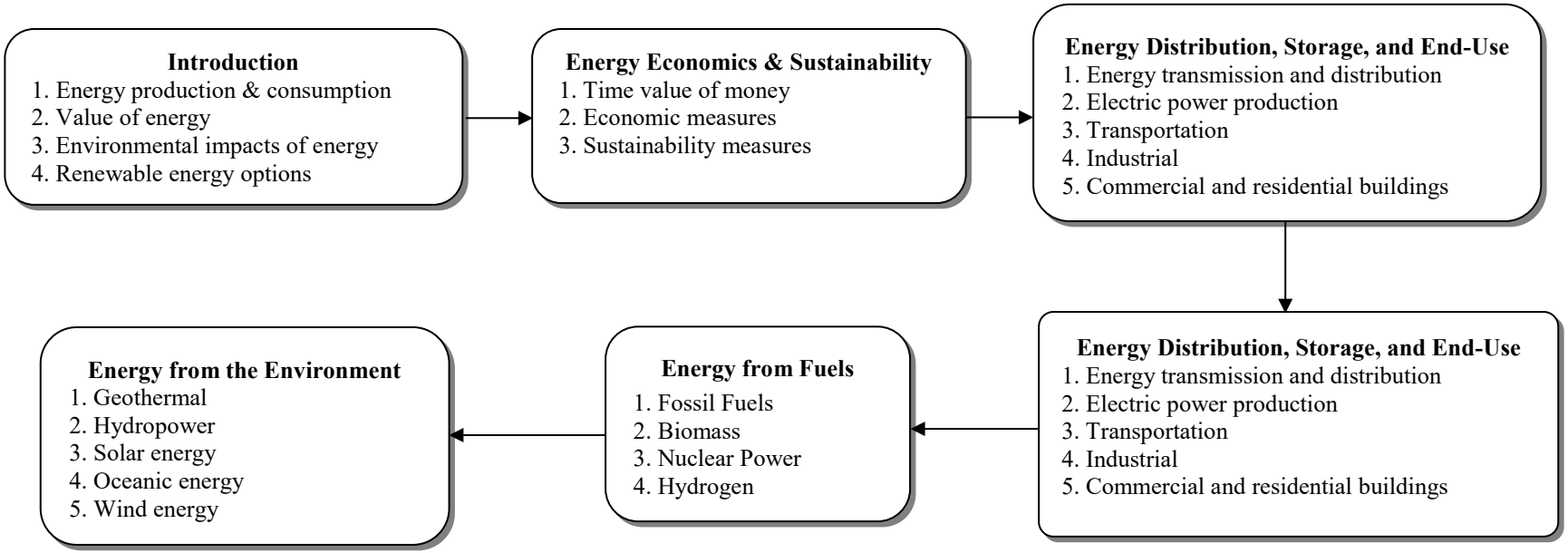
ME 52900
Sustainable Energy Options and Analysis

Course Outcomes

1. Understanding of current energy situation and impacts of energy choices on economics and sustainability metrics. [1]
2. Understanding of alternative technologies for meeting future energy needs. [1]
3. Ability to assess potential for alternative energy technologies in terms of economic and sustainability metrics. [1, 2]
4. Experience in assessing different energy technologies. [1, 2]



Sample Projects (one project per semester)

1. Assessment of Solar Water Heating for the Cary Quad Residence Hall
2. Life Cycle Analysis of a Solar Thermal Methanol Generation Plant
3. Assessment of PV for the Schwartz Tennis Center
4. Regional Assessments of Solar Thermal Power Generation

COURSE NUMBER: ME 52900 **COURSE TITLE:** Sustainable Energy Options and Analysis

REQUIRED COURSE OR ELECTIVE COURSE: Elective

TERMS OFFERED: Fall (Alternate Years)

TEXTBOOK/REQUIRED MATERIAL: Hodge, B.K., Alternative Energy Systems & Applications, 2nd Edition, Wiley (2017)

PRE-REQUISITES: Undergraduate Thermodynamics
Undergraduate Heat and Mass Transfer
Undergraduate Fluid Mechanics
Numerical Analysis

COORDINATING FACULTY: J.E. Braun

COURSE DESCRIPTION: This course focuses on assessment of alternative approaches to improving sustainability of energy production and utilization in our society. It covers resources, extraction, conversion, and end-use and emphasizes the impacts of energy-related technologies on economics and sustainability. Different renewable and conventional energy technologies are presented including biomass, fossil fuels, geothermal, nuclear, wind power, and solar. Students will address how to assess the potential for alternative energy technologies in terms of economic and sustainability metrics and will gain experience in assessing different energy technologies.

COURSE OUTCOMES:

1. Understanding of current energy situation and impacts of energy choices on economics and sustainability metrics. [1]
2. Understanding of alternative technologies for meeting future energy needs. [1]
3. Ability to assess potential for alternative energy technologies in terms of economic and sustainability metrics. [1, 2]
4. Experience in assessing different energy technologies. [1, 2]

ASSESSMENTS TOOLS:

1. Weekly homework assignments.
2. Semester project.
3. One 1-hour mid-term exam.
4. One comprehensive final exam.

RELATED ME PROGRAM OUTCOMES:

1. Engineering fundamentals
2. Engineering design
3. Communication skills
4. Ethical/Prof. responsibilities
5. Teamwork skills
6. Experimental skills
7. Knowledge acquisition

PROFESSIONAL COMPONENT:

1. Engineering Topics: Engineering Science – 2 credits (67%)
   Engineering Design – 1 credit (33%)

NATURE OF DESIGN CONTENT: Students perform an assessment of an energy-related technology or policy that has the potential to improve sustainability. Students work in teams to develop a presentation to the class and a detailed written report that document the assessments. The project reports and presentations are representative of those in industry for such a design assessment study.

COMPUTER USAGE: Students are expected to use a non-linear equation solver throughout the course.

COURSE STRUCTURE/SCHEDULE:

1. Lecture – 3 days per week at 50 minutes.

PREPARED BY: J.E. Braun **REVISION DATE:** February 16, 2019