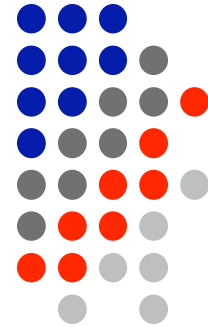


SUSTAINING SUSTAINABLE ENGINEERING DESIGN PROJECTS



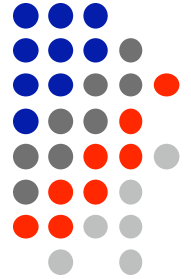
Prof. Phil Doepker
Director, Innovation Center
Mechanical and Aerospace Engineering
University of Dayton

Mudd Design Workshop VII 28-30 May 2009



University of Dayton, Design and Manufacturing Clinic



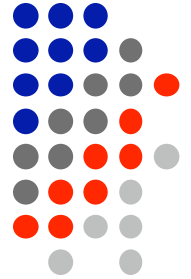


OVERVIEW

- History and Background
- Course Sequence
- Product Realization Process
- Innovation Projects
- Sustainability Projects

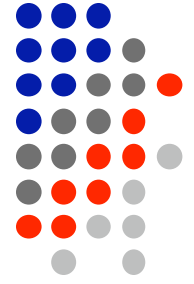


HISTORY AND BACKGROUND

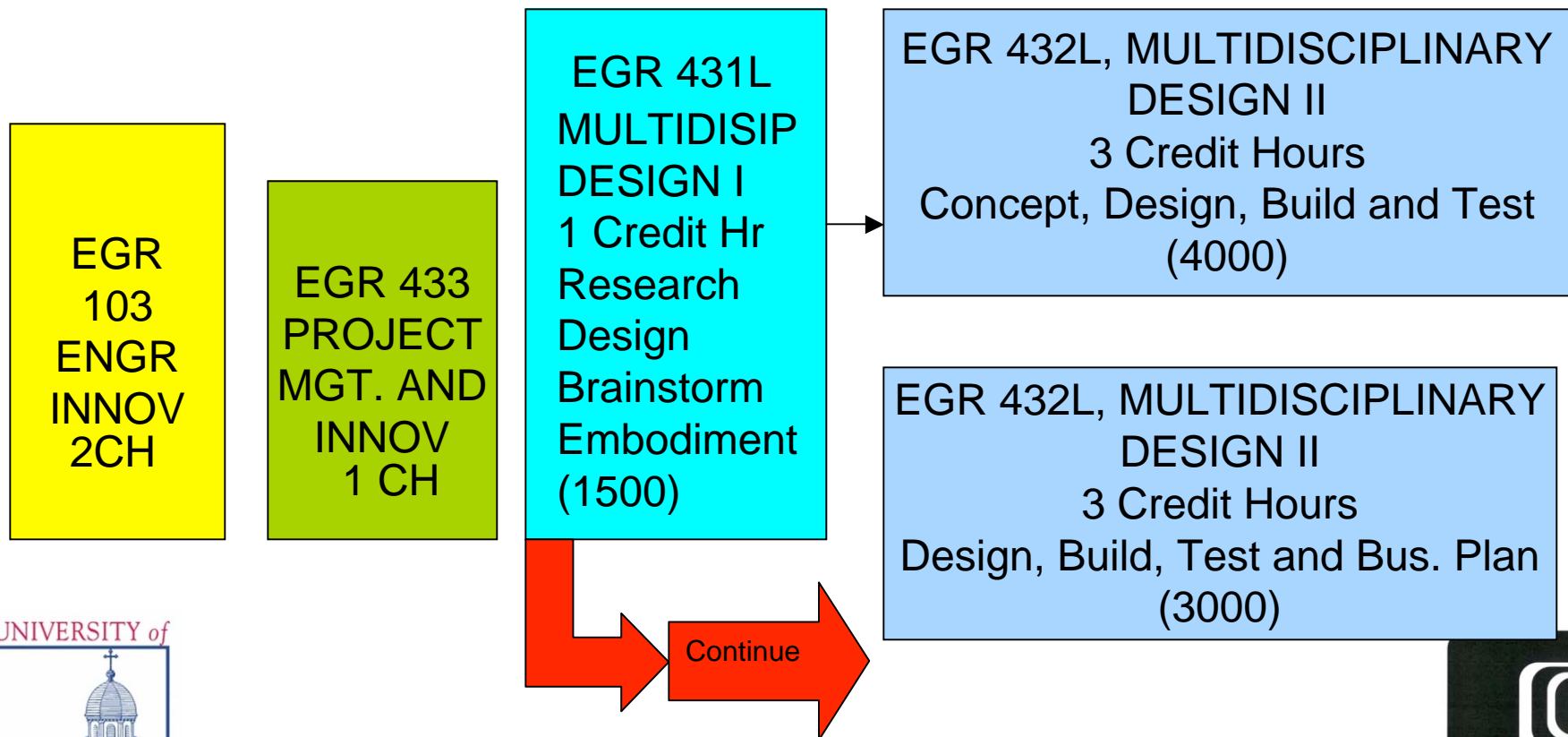


- Team Projects – 25 Years
- 500 Projects and 100 Clients Since 1996
- 80 projects and 350 students per year
- Increased Emphasis on Energy, Environment, and Sustainability – Last 5 yrs
- Energy/Sustainability Projects - 30%
- Innovation Center – Last 4 Years





LANDSCAPE FOR SUSTAINABLE DESIGN – COURSE SEQUENCE



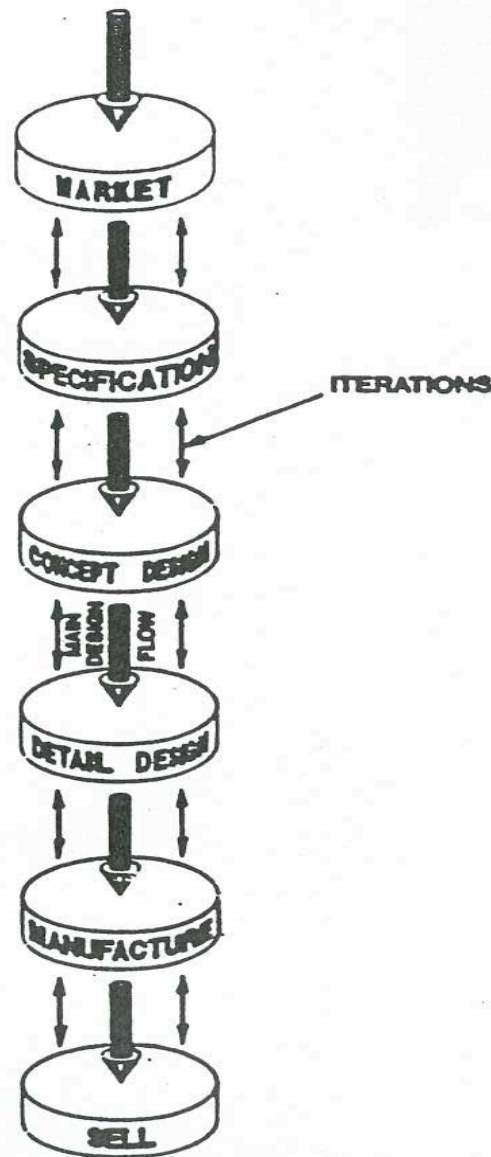
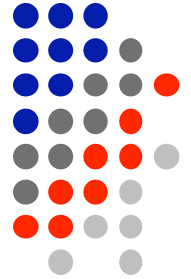


Figure 2.1 Design Sequence (From Pugh)

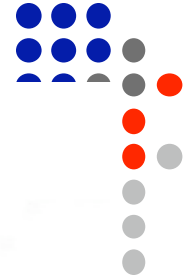


Figure 2.4 Elements (Criteria) of Product Development

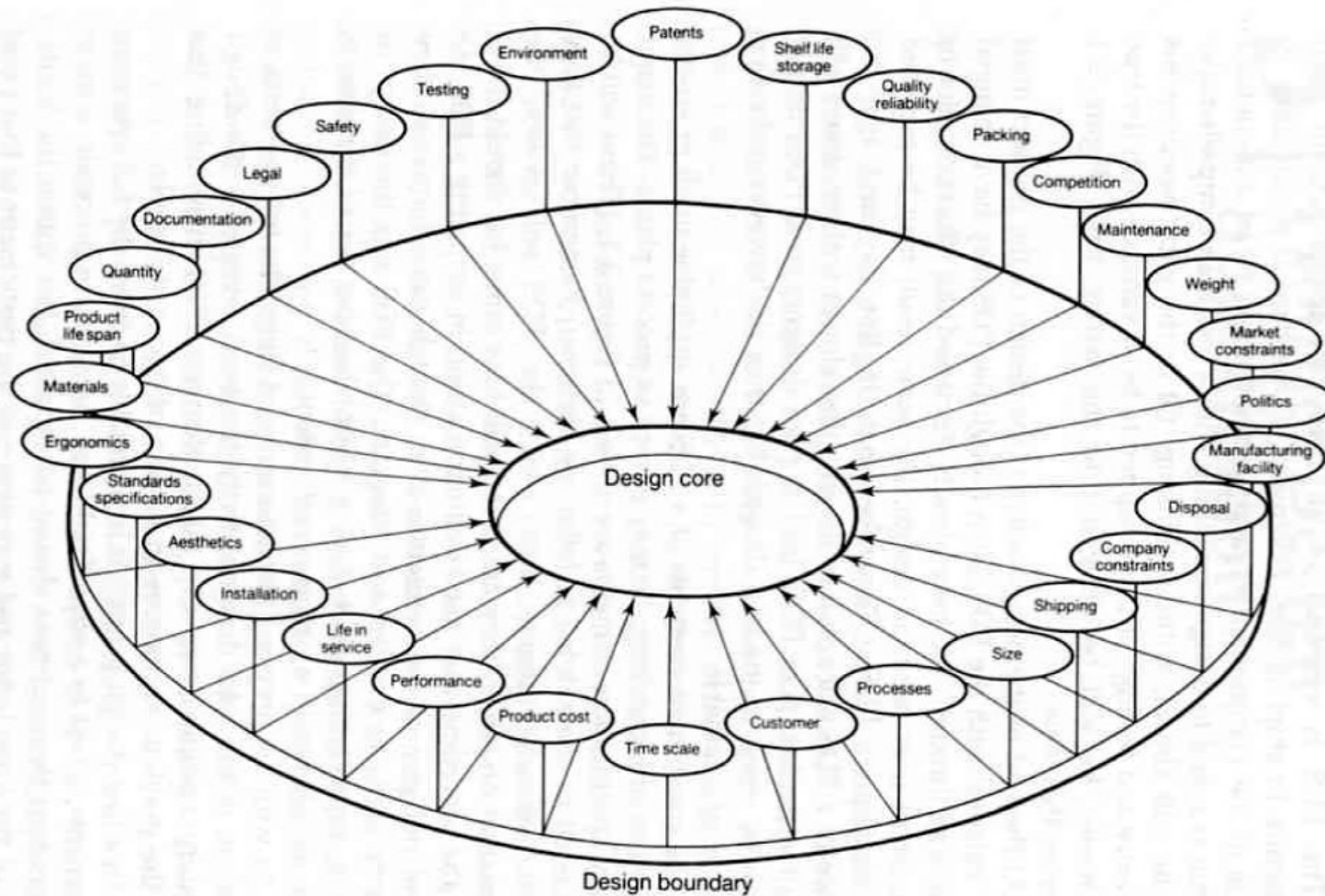
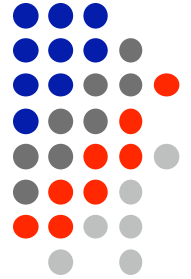
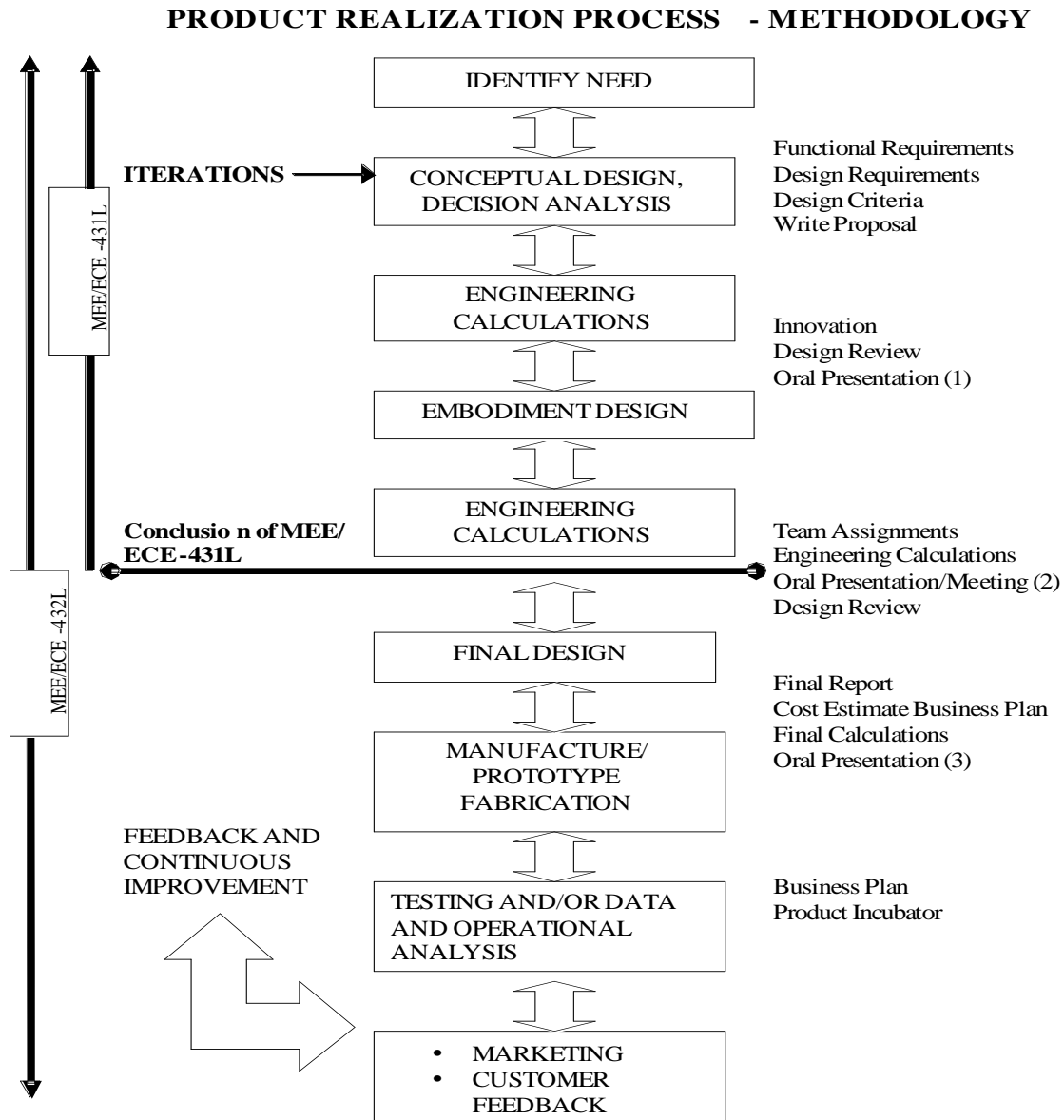
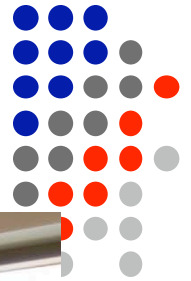


Figure 2.2 Product Realization Process (Doepker, 2)



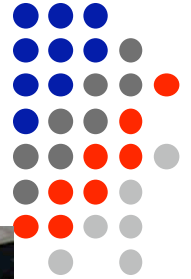
INFRASTRUCTURE - INNOVATION CENTER DESIGN STUDIO



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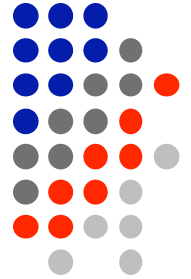
IC PRODUCT DEVELOPMENT LAB



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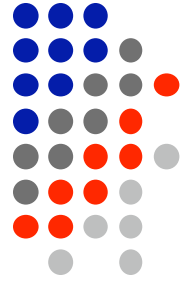


PROGRAMS



- Innovation Center - Clients
- Design and Manufacturing Clinic
- Graduate Program – MS in Renewable and Clean Energy
- Industrial Energy Assessment Center



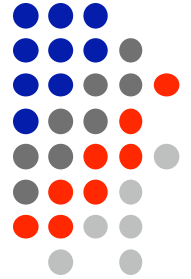


EGR 103 – Engineering Innovation

- Product Development Process – Dym and Little
- Small Team Project
- Large Team Project
 - PV System to Power Pumps in Togo
 - Controls for a PV Panel
 - Sustainable Cabin

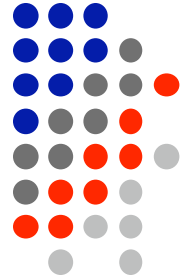


EGR103 Photovoltaic Tracking



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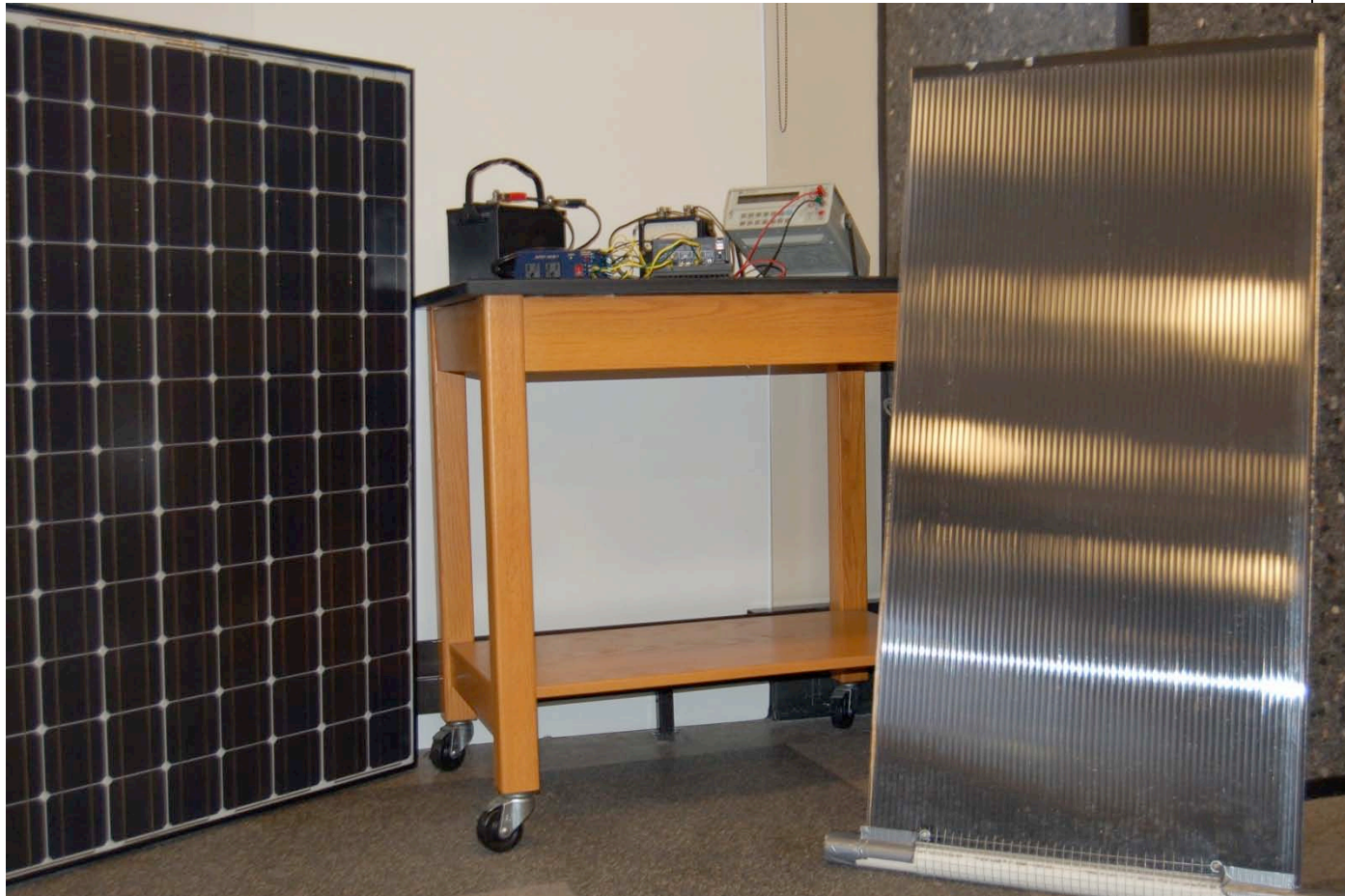
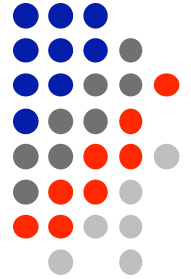


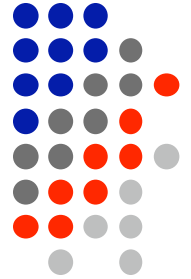
EGR 341L – 1 Credit Hour

- Design of Wind Turbine Components
- Solar Thermal Panels
- Photovoltaic for LED's
- Ground Source (Geothermal) Heat Pumps

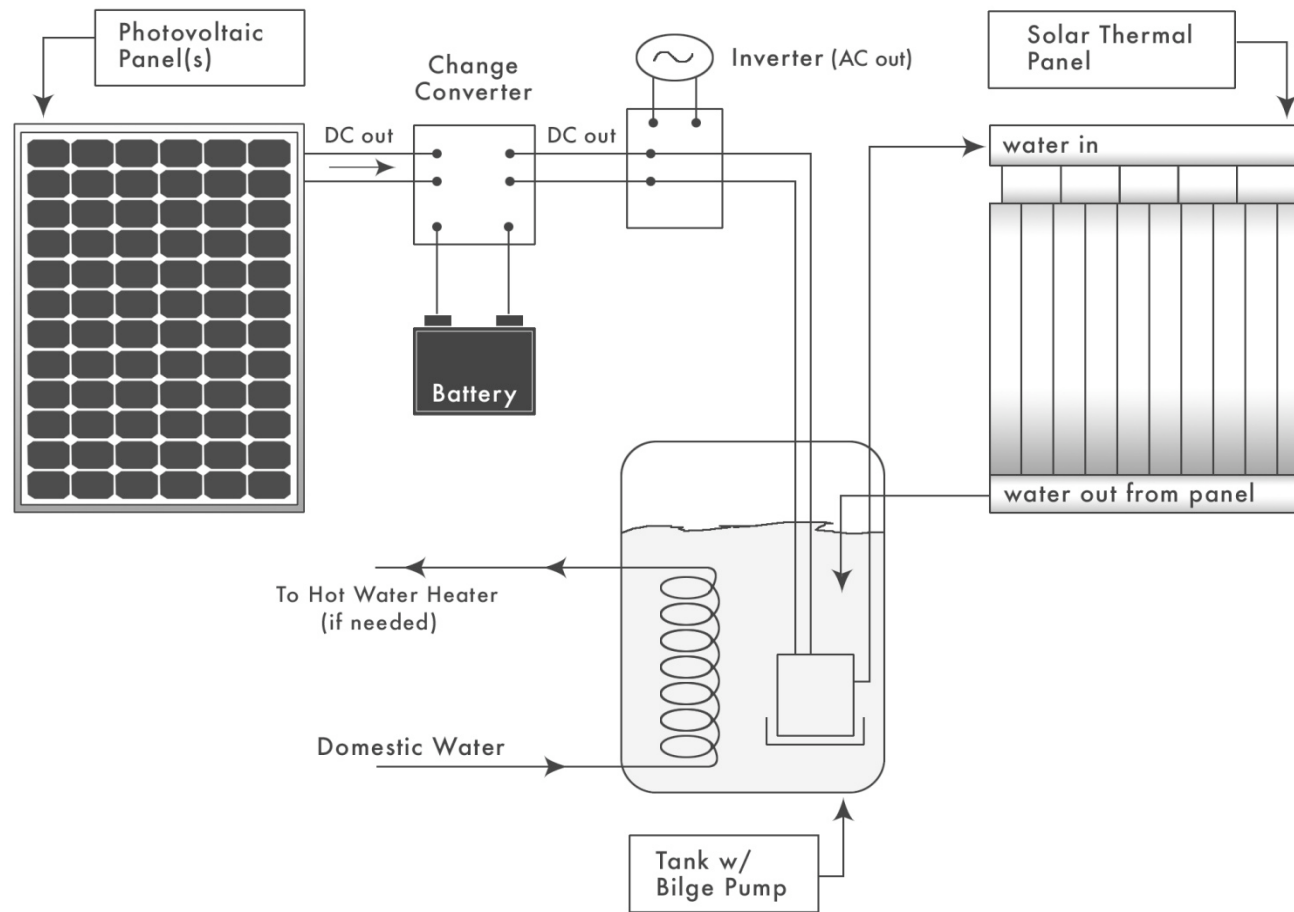


Photovoltaic and Solar Thermal

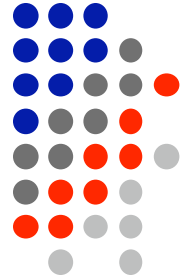




PV/SOLAR THERMAL FOR HOT WATER



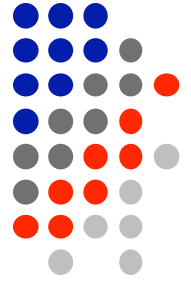
EGR 432L – 3 CREDIT HOURS



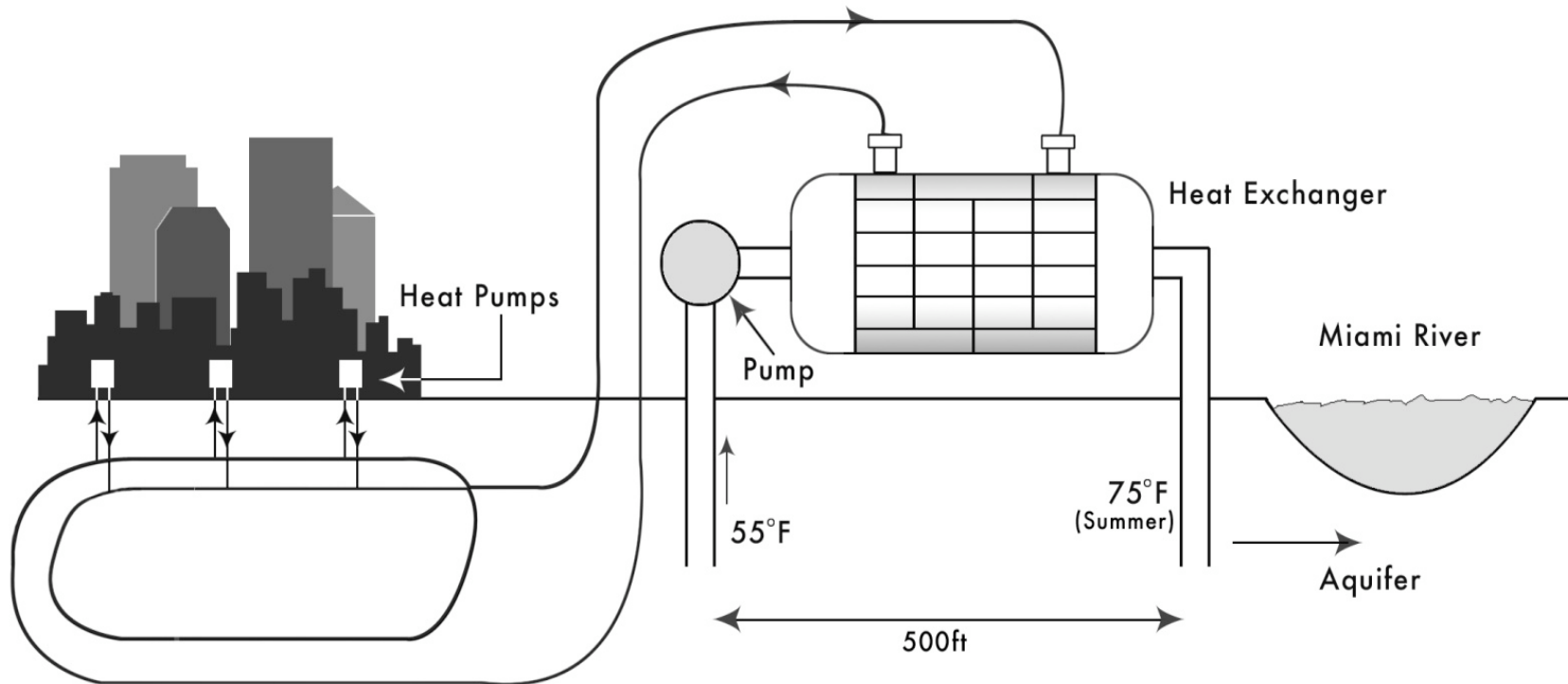
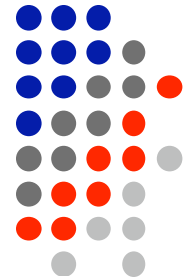
- DESIGN OF AN LED LIGHT CONE
- GROUND SOURCE (Geothermal) HEAT PUMPS
- LED GREEN HOUSE LIGHT
- DESIGN OF AN INDUSTRIAL ENERGY ASSESSMENT PLAN



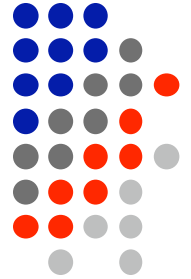
Aquifer – Geothermal



GROUND SOURCE (GEOHERMAL) HEAT PUMPS

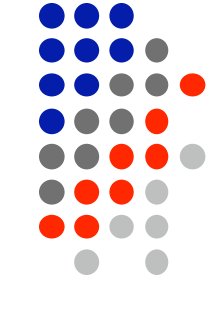


CRITICAL ELEMENTS THAT SUPPORT SUSTAINABLE DESIGN:



- EXPERIENTIAL LEARNING ENVIRONMENT
- FACULTY MENTORS WITH EXPERTISE
- EQUIPMENT, TOOLS AND MATERIALS THAT SUPPORT SUSTAINABILITY
- DESIGN AND LABORATORY FACILITIES
- PROJECT SPONSORS WITH A FOCUS ON SUSTAINABILITY





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