

**TO:** The Engineering Faculty

**FROM:** The School of Mechanical Engineering

**RE:** New Concentration in Energy Processes and Systems for BS in Mechanical Engineering

The Faculty of The School of Mechanical Engineering has approved the following new concentration from the College of Engineering. This action is now submitted to the Engineering Faculty with a recommendation for approval.

**Description:** This concentration in Energy Processes and Systems will provide fundamental and application-specific education that supports design, analysis, and assessment of energy devices and systems that are essential elements of modern society.

**Reason:** Global warming is largely driven by carbon dioxide emissions associated with the burning of fossil fuels that drives energy generation and utilization. Moving towards lower carbon emissions will require a transition to new energy processes and systems for both energy generation and utilization. There will likely be tremendous opportunities for graduates having the expertise to facilitate this transition.

See the appended documentation which provides the specifics of the concentration.



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Jitesh H. Panchal  
Professor of Mechanical Engineering  
Associate Head of Undergraduate Programs

## **Concentration in Energy Processes and Systems for Bachelor of Science in Mechanical Engineering**

**Focus of the Concentration:** Fundamental and application-specific courses in thermal/fluid sciences (thermodynamics, fluid mechanics, heat and mass transfer) that support design, analysis, and assessment of energy devices and systems.

**Proposing [Sub] Area:** This concentration is jointly proposed by the Thermodynamics, Heat & Mass Transfer, and Fluids Academic Areas. The proposal is led by the Heat and Mass Area.

**Target Degree:** BSME

**Concentration Requirements:** Total 9 credit hours, with a minimum of 6 credit hours of ME courses.

**Required Courses:** At least 3 credits from the following courses:

- ME 300 Thermodynamics II
- ME 415 Energy Systems Engineering

The remaining credits can come from the following courses:

*1. Courses related to Energy Conversion and Transport Processes*

- ME 433 Turbomachinery
- ME 503 Micro-and-Nano Scale Energy Transfer Processes
- ME 506 Two-Phase Flow and Heat Transfer
- ME 507 Laser Processing
- ME 508 Heat Transfer in Biological Systems
- ME 511 Heat Transfer in Electronic Systems
- ME 525 Combustion
- ME 533 Turbomachinery II
- ME 597 Fundamentals of Electrochemical Energy Systems
- ME 597 Intro to Electronics Packaging and Heterogenous Integration

*2. Courses related to Energy Generation and Utilization Systems*

- ME 418 Engineering of Environmental Systems and Equipment
- ME 430 Power Engineering
- ME 434 Gas Turbines for Power and Propulsion
- ME 440 Automotive Prime Movers: Green Engines and Clean Fuel
- ME 514 Fundamentals of Wind Energy
- ME 518 Analysis of Thermal Systems
- ME 529 Sustainable Energy Options and Analysis
- ME 597 Solar Energy Systems
- ME 597 Distributed Energy Resources

**3. [up to 3 credits]** Experiential Learning or other Engineering courses with relevance to Energy Processes or Systems:

- ME 497 Mechanical Engineering Projects [variable credit hours]
- ME 498 Research in Mechanical Engineering I [variable credit hours]
- ME 499 Research in Mechanical Engineering II [variable credit hours]
- ENGR 37920 Junior Part in VIP [2 credits]
- ENGR 47920 Senior Part in VIP [2 credits]
- Other 400 and 500-level courses in the Schools of Engineering [with approval from the Associate Head of

Undergraduate Studies]