List A – Environmental Engineering <u>Design</u> Electives - at least <u>one</u> course from this list (faculty can petition to add additional courses)

Per ABET Engineering Accreditation Criteria, "Engineering design is the process of devising a system, component, or process to meet desired needs. It is a decision-making process (often iterative), in which the basic sciences, mathematics, and the engineering sciences are applied to convert resources optimally to meet these stated needs."

<u>CVEN 3424 Water and Wastewater Treatment</u> (pre-req CVEN 3414, Spring) Introduces design and operation of facilities for treatment of municipal water supplies and wastewater. Involves an integrated design of whole treatment systems combining process elements

<u>CVEN 4474 Hazardous Waste Management</u> (pre-req CVEN 3414, intermittent) Requires team design project for site remediation, including alternatives assessment; about 20% of course grade based on that project

<u>CVEN 3323 Hydraulic Engineering</u> (pre-req fluids, Fall) Topics include incompressible flow in conduits, pipe system analysis and design, open channel flow, flow measurement, analysis and design of hydraulic machinery [course also includes a lab component]

<u>CVEN 4323 Water Resource Engineering Design</u> (juniors/seniors, Fall) Studies principles and techniques of water resources engineering design. Introduces environmental modeling under uncertainty, stormwater design, precipitation estimation, and flow routing

<u>MCEN 3032 Thermodynamics 2</u> (junior/senior; pre-req MCEN 3012 Thermo and MCEN 3021 Fluids, Fall and Spring) Offers advanced topics and applications, including thermodynamics of state, entropy and probability, thermodynamic cycles, and reacting and nonreacting mixtures. Provides application to engines and power generation by conventional and alternative energy technologies. Most assignments are design oriented.

<u>ENEN 4600 Energy Engineering Projects</u> (3) (offered fall semester only, prereqs: ENVS 3621 and CHEN 3660 (C grade needed) Restricted to ENMR-MIN Prepares students to analyze energy systems from technical, economic, and policy perspectives, with project topics varying by semester. Provides historical and contemporary context of the energy landscape. Emphasizes application of engineering fundamentals for the design and evaluation of real world energy systems. Projects will be completed in interdisciplinary teams.

<u>CHEN 3220 Chemical Engineering Separations and Mass Transfer</u> (prereqs: CHEN 3200 and CHEN 3320, Spring) Studies separation methods including distillation, absorption, and extraction, and graphical and computer-based solutions to separation problems. Applies mass transfer rate theory to packed and tray columns.